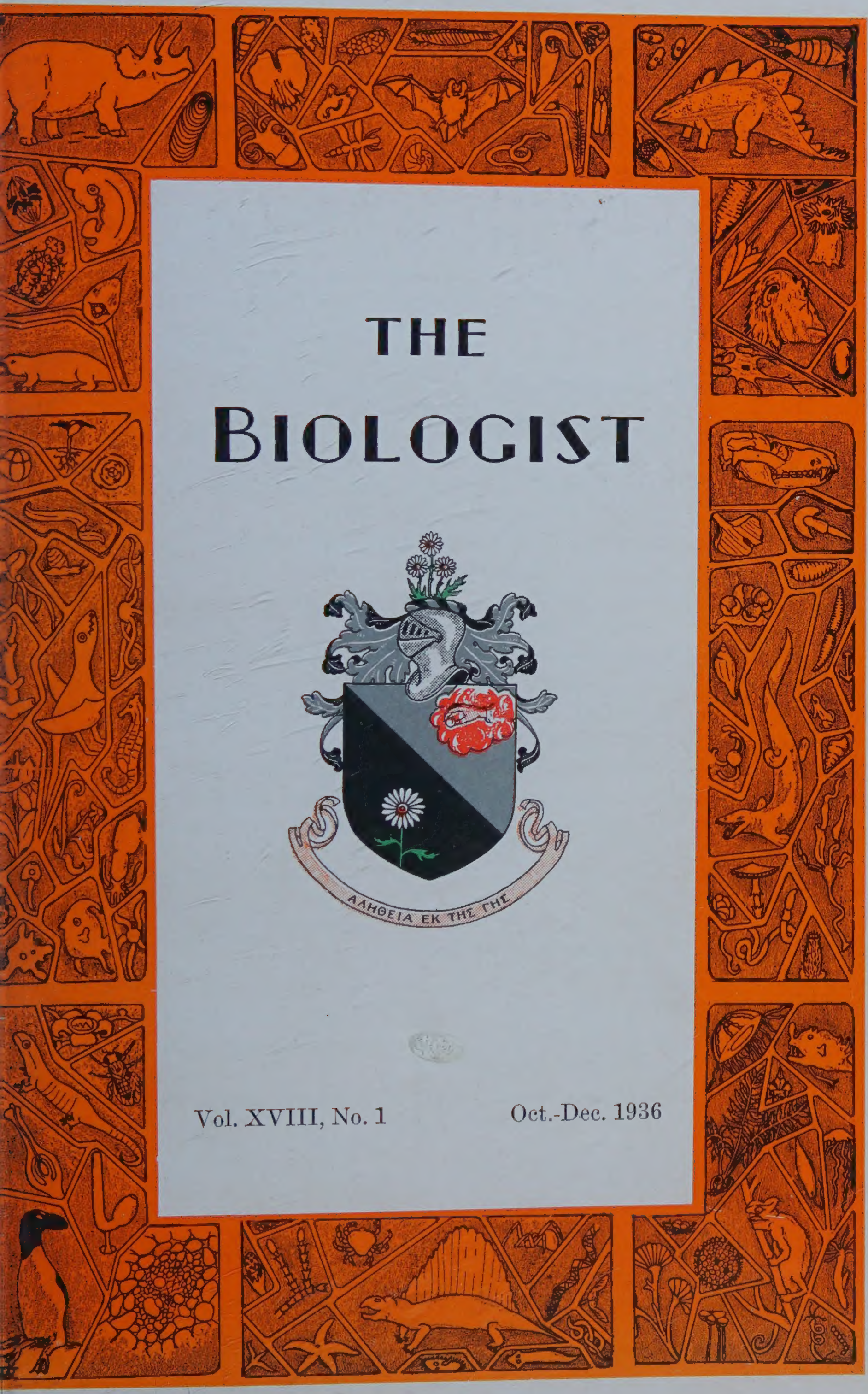
THE

BIOLOGIST



Vol. XVIII, No. 1 Oct.-Dec. 1936

PHI SIGMA
BIOLOGICAL HONOR SOCIETY

"The object of Phi Sigma is to promote interest in biological research. Although originally designated as an honorary biological research society, it should now be considered as a working guild of biologists interested in research. In effect, election to Phi Sigma should be an opportunity for better work, rather than merely election to an honorary society."

Mile Posts:

1915 March 17, Alpha Chapter organized, Ohio State University.
1916 May, Central Governing Body organized, BIOLOGIST first issued.
1917 June, last War-time BIOLOGIST issued.
1921 February, BIOLOGIST revived.
1924 December, First National Convention, Constitution revised, Washington, D. C.
1925 December, Second National Convention, First Scientific Program, Kansas City.
1926 December, Third National Convention, Second Science Program, Philadelphia.
1927 December, Third Science Program, Nashville.
1928 December, Fourth National Convention, Coat-of-Arms adopted, Fourth Science Program, New York.
1930 January, Council Meeting, Ritual Revised, Norman, Okla.
December, Fifth National Convention, Fifth Science Program, Cleveland.
1931 Phi Sigma Letters Registered, U. S. Patent Office.
1932 December, Sixth Science Program, Atlantic City.
1933 June, Sixth National Convention, Seventh Science Program, Chicago.
1935 December, Seventh National Convention, Eighth Science Program, St. Louis.

Expansion:

The Constitution provides that: "An active chapter may be established in any institution of learning which requires for graduation the equivalent of four years of collegiate work, and which is equipped with facilities for research work. - - - - Any petitioning group must be active for at least one year before it may be granted a charter."

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DIRECTORY

OF ALL ACTIVE AND INACTIVE CHAPTERS

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ALPHA

Ohio State University, Columbus, Ohio, founded March 17, 1915, (Inactive).

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ETA

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University of Kansas, Lawrence, Kansas, founded May 31, 1921.

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University of Montana, Missoula, Montana, founded May 4, 1921.

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University of California, Berkeley, California, founded April 27, 1922.

NU

Washington and Jefferson College, Washington, Pennsylvania, founded May 11, 1922.

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University of Nebraska, Lincoln, Nebraska, founded May 3, 1934.

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University of North Dakota, Grand Forks, North Dakota,
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University of Illinois, Urbana, Illinois, founded March 28, 1925.

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University of Florida, Gainesville, Florida, founded December 4, 1925.

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UPSILON

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CHI

Montana State College, Bozeman, Montana, founded February 11, 1927.

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University of Washington, Seattle, Washington, founded April 7, 1928.

OMEGA

University of Oklahoma, Norman, Oklahoma, founded March 24, 1928.

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Mount Union College, Alliance, Ohio, founded May 17, 1928.

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ALPHA DELTA

Lawrence College, Appleton, Wisconsin, founded March 7, 1929.

ALPHA EPSILON

University of Pittsburgh, Pittsburgh, Pennsylvania, founded March 23, 1929.

ALPHA ZETA

College of William and Mary, Williamsburg, Virginia, founded April 19, 1930.

ALPHA ETA

Oklahoma Agricultural and Mining College, Stillwater, Oklahoma, founded March 13, 1930.

ALPHA THETA

State College of Washington, Pullman, Washington, founded May, 1930.

ALPHA IOTA

Bucknell University, Lewisburg, Pennsylvania, founded January 9, 1932.

ALPHA KAPPA

Hunter College, New York City, founded January 8, 1932.

ALPHA LAMBDA

University of Utah, Salt Lake City, Utah, founded February 13, 1932.

ALPHA MU

University and State Agricultural College of Oregon, Eugene-Corvallis, Oregon, founded November 18, 1933.

ALPHA NU

University of New Mexico, Albuquerque, New Mexico, founded April 21, 1935.

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Rhode Island State College, Kingston, Rhode Island, founded May 17, 1935.

THE RELATIONS OF ANIMALS*

DAVID CAUSEY
University of Arkansas

ONE of the things we pride ourselves upon, as cold-blooded scientists unswayed by sentiment and fancy, is exactness in the meaning and use of our terms. When the ignorant layman, for example, objects to having a microscopic amoeba called *Endamoeba histolytica,* a name two inches long as I write it, we contemptiously inform him that by so naming this microscopic bit of protoplasmic jelly it becomes possible for anyone who can read, no matter where he be and no matter what his language, to recognize it and know exactly what we are referring to. For that name indicates a definite one out of the hundreds of thousands of known animals already described.

Many scientific terms do not appear to have meanings. They are used instead as mere professional cant to provide a short hand method of either admitting or disguising our ignorance, etymological cloaks to cover our nakedness. If you think that scientific terms have meanings just ask a scientist to explain a few terms: ask the physicist what an atom is, a chemist to explain valence, a biologist to tell you what a gene is. You needn't listen to his answer, but when he pauses for breath just smile pleasantly and repeat your question. With gentle persistence you can eventually break him down to where he will confess that he really doesn't know, and that he, by tradition and convention, applies that particular term to a certain portion of his ignorance. In zoology we have those useful terms such as species, phylum, adaptation, threshold, survival value, and the like, which are very impressive when used rapidly. Fortunately our students are so busy taking notes they seldom have time to halt us and demand to know what the terms mean. I doubt if we can satisfactorily define ten per cent of the terms we use.

As a parasitologist I am forced to be interested in the intimate animal relations. Such terms as commensals, and commensalism, symbionts and symbiosis, parasites and parasitism are strewn over the pages of our texts, and we use them as glibly as though they meant something. Do they? A none too extensive survey of such textbooks as happen to be on my book shelves leaves me convinced that it would not be very difficult to establish a fair case for holding that commensalism, symbiosis, and parasitism are practically synonyms. When symbiosis is defined as reciprocal parasitism; when the very same relationship is given by one writer as commensalism and by another as symbiosis; when the identical animal is described by one as a commensal and by another as a parasite the confusion becomes evident.

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* Read before the Arkansas Academy of Science, Arts and Letters at Monticello, Ark., Apr. 10, 1936.

Various methods are available for reaching a decision as to the meaning of a scientific term. I do not think that consulting a dictionary is any one of them, whether you have a vest pocket edition or the ponderous Oxford of such tonnage that probably only typesetters and proofreaders have ever read it. No dictionary can hope to keep up with the agility of scientists when it comes to changing the meaning of a term.

A method which at first sight appears very useful is to consult the originator of the term—surely he who fathered it ought to know what it means. Not so, no dead men can tell us what we mean when we use a word. The inventor of a scientific term loses all control over it the moment he prints it, and it is at the mercy of all who follow him in point of time.

The most attractive method is that of appealing to authority. Merely find out how the term is being used today and you have your problem solved. This works best when you have just one reference work, less well if you have two or three, and fails utterly if you have a half dozen or so. The last method which occurs to me is to more or less discard all previous uses and make it mean what you choose. Probably this is the best of the methods available, and I expect to be accused of following it.

The usual close relations of different species of organisms are four in number: 1. Predator and prey; 2. Commensalism; 3. Symbiosis; and 4. Parasitism. Of these the first and last are often difficult to separate in a satisfactory manner, and the middle two seem almost impossible to distinguish. Such, however, is our problem.

When Van Beneden, in 1876, invented the term commensalism he defined it as cases in which "animals have established themselves on each other, and live together with a good understanding and without injury." This, if we interpret it, seems to mean that commensals are animals, that they live together, and that they do not injure each other. What a good understanding is, is less obvious, and a purist might be perplexed about how two animals could live on one another unless he had had the experience of sharing a narrow bed with a companion.

Literally, of course, the word means table companions. Strictly applied, this would lead to absurdities. Are members of the same boarding house table commensals? They are at the same table, they may have a good understanding (that each man is for himself), but they do not necessarily fail to injure one another. He who runs the barrage of fork tines and murderous knives as he reaches for a slice of bread or a hunk of butter is more likely to consider it a struggle for existence with the devil sniping at the hindermost. A dog and a cat may be made literal commensals, but the deep growls and the angry threshing of tails as they share the same dish merely indicate that they have temporarily yielded to a higher and despotic authority. The literal meaning of the term is inadequate.

Let us turn to our authorities and see what they say. They say much, and that much is not easy to present fairly. When one lifts a short definition from a book one often unavoidably leaves behind further explanatory matter which at least modifies the bluntness of the statement. Such, however, is an inherent evil of quoting, and I have endeavored to be as fair as possible. Casting the various definitions into groups of somewhat similar meanings, we find that commensalism may mean any one of three things:

1. The mere association of two or more individuals of different species.

> ''The association of members of two or more species in which neither may be strictly parasitic upon the other in the sense that one feeds upon the tissues of its associate.'' Newman, General Zoology, p. 502
>
> '' . . . commensalism, in which the two organisms merely feed together, without obvious advantages or disadvantages.'' Curtis and Guthrie, General Zoology, p. 259
>
> ''In the kind of association known as commensalism, organisms take up the same abode, or one may live upon or within the other, without either living at the other's expense.'' Holmes, Life and Evolution, p. 236
>
> '' . . . two different forms live in an association that is without harm to either.'' Scott, Science of Biology, p. 511
>
> ''When one form, the host, merely tolerates the presence of the other as a messmate or ''guest'', the condition is termed commensalism.'' Guyer, Animal Biology, p. 78

2. An association of two or more individuals of different species, one of which gains by the association while the other neither gains nor loses.

> ''The term commensal was originally used by Van Beneden (1876) in referring to animals that share the same food, but has now generally come to have a broader meaning and includes all intimate associations between different species of animals which

are not parasites or symbiotic. Commensals are associated and, though one may derive more or less benefit, the other member of the partnership is not essentially injured or benefitted.'' Pearse, Animal Ecology, p. 349

''Commensals are organisms which live with a host without benefit or injury to the latter but to their own advantage.'' Calkins, Biology of the Protozoa, p. 202

'' . . . an association in which one partner is benefitted whereas the other is neither injured nor benefitted; the former is the commensal and the latter the host.'' Hegner, Root, and Augustine, Animal Parasitology, p. 5

''The association of two organisms in which one is benefitted and the other neither injured nor benefitted.'' Hegner, College Zoology, p. 677

''An association of two animals of different species in which one is benefitted and the other not affected.'' Walcott, Animal Biology, p. 563

''Associations between animals in which there is a more or less one-sided benefit but in which the disadvantages to the other member are not marked, if they exist at all, are rather generally included under the term commensalism.'' Krecker, General Zoology, p. 508

3. An association of two or more individuals of different species for mutual benefit.

''The association of two or more individuals of different species, often for mutual benefit.'' Wieman, General Zoology, p. 305

'' . . . an association for mutual benefit less permanent than symbiosis.'' Chidester, Zoology, p. 483

'' . . . a beneficial *external* partnership between two organisms of different kinds.'' Thomson and Geddes, Life: Outlines of General Biology, p. 139

''Commensal association in contrast with parasitic is mutually beneficial. It does not, however, imply an organic union such as prevails among symbiotic forms, but a more or less permanent association for mutual good.'' Lull, Organic Evolution, p. 27

Strictly speaking, this is an external partnership between two forms of different kinds for mutual benefit. Many cases, however, exist which may be allowed to come under this heading where the advantages resulting from the association are by no means equally divided, and may, in fact be entirely on one side.'' Flattely-Walton, Biology of the Sea Shore, p. 135

Symbiosis was the term invented by de Bary in 1879 to cover the interesting relationship between a fungus and an alga which make up what we call a lichen. While this is usually considered as a reciprocally beneficial partnership, it appears that in some cases at least the fungus is parasitic on the alga; and so de Bary's idea of what his term meant must either be abandoned or his example of the relationship be discarded.

The literal meaning of the term is ''living together''. That may mean anything, and has been so considered by various writers. Some hold that all of the intimate animal relations are examples of symbiosis, from a loose partnership such as commensalism on to a hard and fast one such as parasitism. Appeal to our authorities gives us a choice of interpretations. Again casting the various definitions into groups of somewhat similar meanings, we find that symbiosis may mean any one of four things:

1. Two species living together supposedly for mutual benefit.

> ''The living together of two species supposedly for mutual benefit.'' Newman, General Zoology, p. 522

Dr. Newman is cautious, if not very definite, in his statement!

2. Two species living together for mutual benefit.

> '' . . . symbionts are animals, or plants and animals, of different species, that live together to the mutual advantage of each.'' Pearse, Animal Ecology, p. 252
>
> ''The term symbiosis has been used in various senses. It is here applied to all cases of partnership between two organisms of which one lives within the body of the other and both derive benefit from the association. It is sometimes restricted to cases . . . in which the infecting partner is photosynthetic.'' Borradaile-Potts, Invertebrata, p. 44
>
> ''Symbionts are organisms living within a host in such a relation that both are benefitted.'' Calkins, Biology of the Protozoa, p. 202
>
> ''It means a mutually beneficial internal partnership between two organisms of different kinds. The fact of ''mutual benefit'' serves as well as one can expect to exclude parasitism, where the advantages in typical cases at least, are all on one side. The adjective ''internal'' serves to exclude commensalism, an externally mutually beneficial partnership, such as that be-

tween a hermit-crab and the sea anemone it carries.'' Thomson and Geddes, Life: Outlines of General Biology, p. 133-134

''The term symbiosis is applied to an association between a host and its entozoa when the association is of benefit to both parties.'' Hegner and Taliaferro, Human Protozoology, p. 125

''The association of two species of organisms for mutual benefit.'' Wieman, General Zoology, p. 314

''The close relationship of two organisms for mutual benefit.'' Chidester, Zoology, p. 553

''The association of two species for their mutual benefit.'' Shull, Principles of Animal Biology, p. 406

'' . . . living together with mutual benefit . . . '' Curtis and Guthrie, General Zoology, p. 259

''Mutually beneficial association of two species.'' Guyer, Animal Biology, p. 719

''There are commensals, which live in or upon another organism, and though deriving benefit from this association, do not injure the host in any way. They deprive it of an inappreciable amount of material which it might use itself, or feed upon the waste products. Others are regarded as *symbionts*, which, living in similar circumstances, not only benefit themselves, but contribute to the well being of the Host.'' Wenyon, Protozoology, p. 134-135

''Social life may, indeed, be regarded as a special form of symbiosis. This term, which signifies the living together of organisms in a balance, cooperative, reciprocally helpful manner, is commonly applied interspecifically, that is, to partners thus related belonging to different species, but there is no reason why it should not be applied to the same kind of relations between individuals of the same species, that is, intraspecifically.'' Wheeler, Social Life Among the Insects, p. 195

3. Two species living together for mutual benefit, the association often obligatory.

''The living together of two organisms, this usually being obligatory and mutually beneficial.'' Hegner, College Zoology, p. 683

'' . . . those remarkable cases of intimate union between two animals or between an animal and a plant, the two being entirely or partially dependent one upon the other, a condition known as ''symbiosis''. Russel and Yonge, The Seas, p. 197

"The term is applied, in the strict sense, to the close physiological association of two distinct organisms for mutual benefit. So intimate, indeed, is the symbiotic relationship, that one or both of the partners may be incapable of living alone." Flattely and Walton, Biology of the Sea Shore, p. 149

4. An obligatory association for mutual benefit.

"The association of two species in a practically obligatory and mutually advantageous partnership, e.g., Lichens, Hydra (green)." Woodruff, Animal Biology, p. 491

"An intimate association of two organisms of different species, neither of which can flourish in the absence of the other." Walcott, Animal Biology, p. 582

" . . . an association in which both organisms are vitally necessary to the life of each other." Scott, Science of Biology, p. 512

"Symbiosis is a term that is frequently employed to describe a certain type of association between two species of organisms. This term was proposed by de Bary in 1879 for the constant, intimate, and mutually beneficial association of two organisms. Etymologically, symbiosis means simply "living together," and hence should include parasitism and other types of association. Usually, however, symbiosis is used to imply the permanent association of two specifically distinct organisms so dependent on each other that life apart is impossible." Hegner, Root, and Augustine, Animal Parasitology, p. 5

"This is the most intimate association of all, again for mutual benefit, and by some writers it seems to be considered as merely a more intimate form of commensalism. Symbiosis means *living together* and in its restricted sense implies an organic union or internal partnership between organisms so intimate that it can only be severed by death. As thus restricted, it cannot exist between two animals but only between an animal and a green, chlorophyll-bearing plant or between a green and a colorless plant, such as show contrasted methods of feeding." Lull, Organic Evolution, p. 28

It is evident that appeal to authority offers no certain way of determining either what commensalism and symbiosis are or as to just how they are to be distinguished. We shall return to this problem later on.

The origin of the term parasite, which goes back to the days of the old Greeks, is rather interesting. Parasites were originally assistants to the priests, collectors of the material things due the temples. They had other duties such as feeding visitors and aiding in sacrificial banquets. In time the term parasite came to mean more and more its literal significance of ''messmate'', there being first a distinction between those who sat *ex officio* at the banquet and those who were invited. Still later, and with a note of contempt, came its application to those who in search of a good dinner, crashed the gate as we now say, and got a good place at the banquet table. Apparently no humiliation and no reproach was sufficient to keep them away. From them, it appears, we can trace by descent our court fools and court jestors of later days.

There is more agreement as to what a parasite is than there is in respect to the other types of relationships. It is always an organism which lives at the expense of another. Van Beneden described it quite well:

> ''The parasite is he whose profession it is to live at the expense of his neighbor, and whose only employment consists in taking advantage of him, but prudently, so as to not endanger his life. He is a pauper who needs help, lest he should die on the public highway, but who practises the precept—not to kill the fowl in order to get the eggs. It is at once seen that he is essentially different from the messmate who is simply a companion at table. The beast of prey kills its victim in order to feed upon his flesh, the parasite does not kill; on the contrary he profits by all the advantages enjoyed by the host on whom he thrusts his presence.''

Elton, in attempting to distinguish between a carnivore and a parasite, always a troublesome matter, says:

> ''The difference between the methods of a carnivore and a parasite is simply the difference between living upon capital and upon income; between the habits of the beaver, which cuts down a whole tree a hundred years old, and the bark-beetle, which levies a daily toll from the tissues of the tree; between the burglar and the blackmailer. The general result is the same, although the methods employed are different.''

Pearse gives us a nice summary of parasitism:

> ''Parasitism is an intimate relation between two animals in which one is injured. Usually the parasite takes food from its host, but parasitism is not always concerned with food relations. Parasites may do injury by occupying space within the bodies

or dwellings of their hosts, by giving off poisons, and by other means.''

The last method of determining the meaning of terms is that of giving them what ever meaning you choose yourself. I have reached this last resort, and offer the following humbly but not contritely. That there are myriads of relations between organisms of the same and different species is obvious, that we as yet know little about them is perhaps still more obvious. I question the need of terms to cover every possible relationship that our ingenuity can suggest. A few terms, with clear cut meanings, will serve. For those relationships which are usually between different species, but not necessarily so, the following terms and meanings are suggested:

1. Associates—animals and or plants which are found together so often as to suggest that there is some reason, as yet unknown, other than mere chance for the association. This is the hold-all, the place where we may put the relationships about which we know little or nothing. Here we should put those possible relationships where one gains by the association while the other neither gains nor loses so far as we know—a relationship which often means no more than that the surface of the one organism serves as a substratum for another.

2. Commensals—animals and or plants which form a voluntary mutual benefit association. The partnership is not obligatory, each can, and members of each species often do, shift for themselves, yet because of the mutual gain they are often found together. This is essentially what Van Beneden called mutualists, a term which for some reason has not found favor and is seldom used. The traditional example of textbooks, a crab carrying some type of sponge or hydroid on its back will illustrate the meaning.

3. Symbionts—animals and or plants which form an obligatory mutual benefit association. There are few certain examples of this relationship. The termites and their intestinal protozoa are symbionts in this sense. The yucca and its moth is another example.

4. Parasites—animals or plants which live on or within another organism (the host) and by so doing do a physiological harm to the latter. This definition separates the carnivore from the parasite. The carnivore does not live on or within the host. Accordingly such forms as mosquitoes, ticks, and leeches are rightfully classified as carnivorous animals and not as parasites.

A SCIENTIST'S ANTHOLOGY

MELVILLE H. HATCH
University of Washington

LIFE is short, and the art is long; the occasion fleeting; experience fallacious, and judgment difficult.—Hippocrates.[1]

The superior man does not expose himself needlessly to danger, since there are few things for which he cares sufficiently; but he is willing, in great crises, to given even his life,—knowing that under certain conditions it is not worth while to live. He is of a disposition to do men service, though he is ashamed to have a service done to him. To confer a kindness is a mark of superiority; to receive one is a mark of subordination . . . He does not take part in public displays . . . He is open in his dislikes and preferences; he talks and acts frankly, because of his contempt for men and things . . . He is never fired with admiration, since there is nothing great in his eyes. He cannot live in complaisance with others, except it be a friend; complaisance is the characteristic of a slave . . . He never feels malice, and always forgets and passes over injuries . . . He is not fond of talking . . . It is no concern of his that he should be praised, or that others should be blamed. He does not speak evil of others, even of his enemies, unless it be to themselves. His carriage is sedate, his voice is deep, his speech measured; he is not given to hurry, for he is concerned about only a few things; he is not prone to vehemence, for he thinks nothing very important. A shrill voice and hasty steps come to a man through care . . . He bears the accidents of life with dignity and grace, making the best of his circumstances, like a skillful general who marshals his limited forces with all the strategy of war . . . He is his own best friend, and takes delight in privacy whereas the man of no virtue or ability is his own worst enemy, and is afraid of solitude. —Aristotle.[2]

The philosopher should be a man willing to listen to every suggestion, but determined to judge for himself. He should not be biased by appearances; have no favorite hypothesis; be of no school; in doctrine acknowledge no master. He should not be a respecter of persons, but of things. Truth should be his primary object. If to these qualities be added industry, he may indeed hope to walk within the veil of the temple of Nature.—Faraday.[3]

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[1] *Aphorisms* Sec. I, no. 1; vol. II, p. 192 of *Genuine Works of Hippocrates* translated by Francis Adams (William Wood and Co., 1886).

[2] *Ethics*, IV, 3, selected and translated by Will Durant, pp. 64-66 of *A Guide to Aristotle* (Haldeman-Julius Co., Little Blue Book No. 39, 1923) and pp. 89-90 of *The Story of Philosophy* (Simon and Schuster, 1926).

The scientist who achieves intellectual and emotional maturity without losing his investigative vitality and courage—that is, without metaphysical surrender—can come to rest in philosophical tranquility with the recognition that science, however highly developed, may never answer the ultimate questions; but that there may be happiness in contemplating nature's orderly coordinations, and peace in modest fellowship with the rational and humane spirits who, throughout the brutalities of history, have held to the purpose of reason.—Hans Zinsser.[4]

What can I wish to the youth of my country who devote themselves to science? *Firstly*, gradualness. About this most important condition of fruitful scientific work I never can speak without emotion. Gradualness, gradualness and gradualness. From the very beginning of your work, school yourselves to severe gradualness in the accumulation of knowledge. Learn the ABC of science before you try to ascend to its summit. Never begin the subsequent without mastering the preceding. Never attempt to screen an insufficiency of knowledge even by the most audacious surmise and hypothesis. Howsoever this soap-bubble will rejoice your eyes by its play it inevitably will burst and you will have nothing except shame. School yourselves to demureness and patience. Learn to inure yourselves to drudgery in science. Learn, compare, collect the facts. Perfect as is the wing of a bird, it never could raise the bird up without resting on air. Facts are the air of a scientist. Without them you never can fly. Without them your "theories" are vain efforts. But learning, experimenting, observing, try not to stay on the surface of the facts. Do not become the archivists of facts. Try to penetrate to the secret of their occurrence, persistently search for the laws which govern them. *Secondly*, modesty. Never think that you already know all. However highly you are appraised, always have the courage to say to yourself—I am ignorant. Do not allow haughtiness to take you in possession. Due to that you will be obstinate where it is necessary to agree, you will refuse useful advice and friendly help, you will lose the standard of objectiveness. *Thirdly*, passion. Remember that science demands from a man all his life. If you had two lives that would not be enough for you. Be passionate in your work and your searchings.—Pavlov.[5]

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[3] Quoted by Norman H. Joy on p. 19 of *British Beetles* (Frederick Warne and Co., Ltd., 1933).

[4] P. 37 of *Rats, Lice and History* (Little, Brown, and Co., 1935).

[5] Translated by Prof. P. Kupalov in *Science*, 83, 1936, p. 369.

NATURAL GARDENS OF SOUTHERN CALIFORNIA.*

George R. Johnstone
University of Southern California

THERE are few places in the world where so many varied types of natural gardens occur within so small a geographical range as in southern California. This local distribution of Nature's Gardens and some of their characteristics will be the subject of my travelogue this afternoon.

If you will accompany me on an imaginary journey to a lofty hilltop overlooking the great Pacific Ocean, then down to its rocky shores for closer observations, thence inland to our chaparral-covered hillsides, up a canyon to the highest mountains, and finally to the Mojave Desert, I shall show you some of Nature's Gardens which are unexcelled in their wonderfulness elsewhere in the world.

From the hilltop overlooking the mighty Pacific one can see the massive kelp bed with its brown foliage lying listlessly in the sunshine. It may seem that these massive plants, ''Toil not, neither do they spin''; quite to the contrary, they are huge carbohydrate factories which run constantly throughout the day and even into the night whenever there is moonlight. The energy which keeps these factories working to full capacity is furnished by the sun and the moon.

The kelp plant itself is a massive individual attached to the rocks by holdfasts, and buoyed up on the waves by pneumatocysts filled with peculiar gases. In some cases carbon monoxide has been found in these airbladders in sufficient quantity to kill small animals after a few minutes of exposure. These gaseous filled cavities are very large, in some species having a capacity of one gallon. In size the kelp plants are the largest aquatic members of the plant kingdom; they correspond to the whales of the animal kingdom. Such a picture from the hilltop gives us only a hazy view of the marine garden.

Now let us go down to the seashore where the surf perpetually beats back and forth against the rocks. Here one would expect the vegetation to be torn to pieces. Many plants, however, can withstand such a beating while the more delicate grow luxuriantly in the somewhat protected areas. This is indeed a strange type of natural garden growing on solid rock surfaces. These plants differ from land plants particularly in their method of absorption of raw materials from their environment. Instead of possessing roots for absorption and stems for conduction, they absorb materials from their surrounding medium of water throughout all parts of their bodies; consequently these plants are undifferentiated in structure; they do not possess true roots, stems, or leaves. The plants of the marine garden are most noteworthy for their bright colors; some are blue-green, some brown, some red, and others green. The green pigment is common to all, but its brilliance is masked excepting one group. The plants of nature's marine garden are called algae, spelled A-L-G-A-E, and the algae are named according to their most conspicuous color. Four classes are recognized: the blue-green, the brown, the red, and the green algae.

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* Radio Talk, Station KRKD.

Now, as we leave the seashore, let us go to the mountains; for it is warm and smoky in the valleys, where nature's gardens have been very much disturbed by the activities of mankind. In our approach to the mountains we first meet the foothills covered with chaparral, a dense scrubby growth of shrubs and small trees perpetually green in color forming an impenetrable thicket except for trails which have been constructed by the United States Department of Forestry. One of the most delightful of these trails extends through the upper limit of the chaparral from Mt. Lowe Tavern to Mt. Wilson, where it terminates in the coniferous forest. From the latter portion of this trail one can see a similar forest of pine and incense cedar on Barley Flats about five miles north of Mt. Wilson.

Just why the chaparral terminates so near the summit of the high mountains at a point where the coniferous forest begins cannot be answered in every detail. It is probable that the moisture relations as influenced by wind and temperature play a very important role in such plant distribution.

Another approach to the high mountain area is possible. If one should drive up a canyon, such as the Arroyo Seco, or San Gabriel, a remarkably different type of nature's gardens would be found. On the moister floor of the canyon, willows, sycamores, and alders predominate; while on the somewhat drier areas, California laurel, broad-leaf maple, and canyon oaks are frequent. These trees, particularly the willow, the maple, the sycamore, and the alder, differ from those of the coniferous forest by losing their broad, thin leaves in the autumn. This shedding of leaves is a means of protection against the dry desiccating winds of winter when absorption of water and the conduction of sap are difficult processes for the plant. If the plant loses more water than it can absorb or distribute within it, life is endangered. In the coniferous forest the trees retain their leaves throughout the year; they are evergreen, and the leaves are needle-like, or scale-like. As we follow up one of these canyons, we finally come to our first conifer, the big-cone spruce, a near relative of the Douglas Fir, a northern species so well known for its lumber. Here again in the canyon the water relation is the important factor in tree growth. With an adequate supply and some protection against excessive losses of water, tree growth is possible.

Now let us take a glimpse of the deserts of the Southwest. From the summit of Mt. San Antonio one can see the gray outline of a part of the Mojave Desert. Such a view is self-satisfying during the hottest days of the summer, but during the autumn, winter and spring months the deserts are hospitable, and possess all of the charm that one can hope for among Nature's Gardens.

One must live in the desert to become acquainted with it. Of all of the descriptions of the desert, that of S. B. Parish seems most fitting:

> The one prevailing aspect of the entire desert in all its varied topographical configuration, universal throughout, only here and there more accentuated, is of a land at the extreme of old age, perhaps once, long ago, endowed with the glad freshness of youth, but now outworn and without hope for the future. And it may well be that this is not a mere idle figure of speech, that there was a greener youth. We see today that for the deserts, water is the elixir of life which rejuvenates them. When a sufficient rainfall occurs, at rare intervals it covers the whole desert with a carpet of flowers, and artificial irrigation transforms the barren waste to fields of luxuriant crops. Now there is abundance of evidence that in the Pleistocene age, perhaps 20,000 years ago, this whole region enjoyed an abundant rainfall, and as a necessary sequence, must have had vegetation very different in its character from that which prevails today. What ebbs and flows there must have been in the amount of precipitation during these long intervening ages, each registering its results in the character and abundance of the vegetation; but each successive ebb falling a little lower as desiccation gradually advanced.

Thus the Mojave Desert at one time consisted of several large lakes separated from one another by mountain chains, and several smaller lakes distributed over a large area; but today only remnants of these lakes remain, most of them being utterly dry salt beds. Mention will be made of the four largest of these ancient lakes, enumerating them in the order of their elevation from the lowest to the highest. First, Death Valley, located in the extreme northeastern part of the Mojave, originally contained a lake 60 miles long and 400 feet in depth. This lake never had an outlet; the water entering, evaporated leaving a great salt bed up to 1000 feet in depth. About 300 feet above the former level of this lake, and westward from Death Valley, Panamint Valley occurs; originally contained a lake 900 feet in depth, which emptied its water into Death Valley lake. Panamint Valley is now one of the hottest and driest spots in the desert. Searles lake comes next in order of elevation. This is a vast area of salt with enough water present to make brine. This brine is pumped into the salt works at Trona where the purified constituents are separated. Finally, Owens lake, the last of this chain of great lakes lies to the extreme west where it is continuously supplied with water from the melting snow of the great Sierra Nevada mountains. Of all these lakes Owens lake remains as a significant body of water. Thus as the mountains of the Mojave have eroded away, the waters from these great lakes for the most part, and from smaller lakes, have evaporated, leaving salt beds. Thus we find here the most inhospitable part of the desert due to the lack of water with the severity intensified by the abundance of salt absolutely devoid of vegetation save for a few blue-green algae which are tolerant of high concentrations of salt. However, on somewhat higher levels of the desert, and even in the hottest valleys where the salt content of the soil is not too great, vegetation does appear.

So among all of Nature's Gardens, that of the desert is the most perplexing, and the most remarkable plant which resists drought more than any other is the creosote bush found scattered throughout the Mojave desert extending over into the Amargosa Desert of Nevada, the so-called bitter desert, where it presents a magnificent picture. This desert shrub with its waxy leaves, perpetually green, bearing its flowers in early spring, enters into a state of rest during the hottest days of the summer at a time when no more water is available in the soil, continues to live with activity reduced to a minimum only to be revived when the rains of late autumn or early winter again occur.

The problem of the desert is met in another very different manner. Certain plants are known as drought evaders. Here the annual herbs are classified, since they germinate from seed, come into flower, and mature their fruit within a single growing season before the dry hot summer ensues. Such plants evade the drought by existing in the form of dry seeds during the dry, hot summer. The cactus plant on the other hand appears to thrive by employing a third method of evading drought or the dry period of summer. The cactus is well known by everyone for its capacity to store water. At one time I compared the cactus plants with the multimillionaires of the financial world who accumulate wealth during times of plenty and release it sparingly during times of depression. In like manner the cactus plants must have their reservoirs filled to capacity at regular intervals.

Cactus plants are by no means the most frequent plants encountered in the desert, yet due to their conspicuous fleshy, usually thorny or spiny stems they are the most conspicuous of all the desert flora. There are about twenty different kinds of cacti in the Mojave desert. However, the cacti do not occur in the driest nor the hottest parts of the desert. Most species require gravelly or rocky soil; some species require rock crevices. In general their root systems are shallow, and efficient absorbers of water from near the surface of the soil, following light as well as heavy rainfall.

In summarizing, may I further state that Nature's Gardens of southern California are indeed wonderful. In this travelogue it has been possible to trace the varied types of vegetation in their relation to water from the strictly aquatic type found in the Pacific Ocean to the tree type of the canyons, to the somewhat drought enduring type found in the chaparral, and coniferous forest to extremely drought resistant forms as exemplified by the creosote bush which enters into a state of rest or dormancy during the hotest and driest period of the summer when the soil contains no available water whatsoever for this plant. The cactus plant on the other hand is a drought evader because it stores water for use during the period when no other water is available in its vicinity.

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THE COMPLETE ANGLER*

DR. DAVID CAUSEY
University of Arkansas

MUCH of the famous literature of Biology fails to find its way into the classroom. Among such little known works is Gilbert White's "Natural History of Selborne" which makes such an appeal to one with a quiet love of the out-of-doors. Another such gem is Izaak Walton's "Complete Angler". Somewhere in Heaven there must be a placid pool and a mossy log where the world weary Biologist will be allowed to sit and talk with old Izaak as they watch the corks drift in tiny circles. I have turned to the Complete Angler and copied out a chapter. It is toward the end of the book, and may be missing from some editions. It is entitled:

A Meeting betwixt a Zoologist and a Botanist, Each Commending his favorite Recreation.

Zoologist: You are well overtaken, Sir: a good evening to you: I have stretched my legs up East Mountain to overtake you, hoping your business may occasion you towards Swartz's, whither I am going this fine October evening.

Botanist: Sir, I, for my part, shall answer your hopes, for I, too, go to Swartz's, who keepeth a goodly house where choice friends get together. I go there to discuss our favorite topic of thought, which is Botany.

Zoologist: Botany? Botany? Yes, I have heard of it. You collect weeds from the ditches, methinks, and crush them in papers.

Botanist: True, Stranger, in part. We do other things besides.

Zoologist: Tell me, Botanist, as we climb the weary hill, how so intellectual a man as you seem to be is able to content himself with such trifles?

Botanist: Gladly, Stranger, but first, what do you?

Zoologist: I am a Zoologist. I study the most important of the world's mysteries. I study life, I see . . . zounds!

Botanist: Too bad, I thought you had seen the brier. Are you hurt?

Zoologist: Badly scratched is all, curse the wretched thing. What is it doing in the path?

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* Read at the opening meeting of the Botany Seminar, University of Arkansas, Oct. 3, 1935.

Botanist: That is a botanical problem, Sir. But before I discuss my Botany, pray tell me about this most important field of Zoology. Has it an honorable history, does the Good Book speak of it?

Zoologist: Verily, Botanist. Has thou not read?

> "And God said, Let the waters bring forth abundantly the moving creature that hath life, and fowl that may fly above the earth in the open firmament of heaven."

and again:

> "And God created great whales, and every living creature that moveth, which the waters brought forth abundantly, after their kind, and every winged fowl after his kind: and God saw that it was good."

and still again:

> "And God said, Let the earth bring forth the living creature after his kind, cattle, and creeping thing, and beast of the earth after his kind: and it was so."

to say nothing of that noble verse which goes:

> "And God said, Let us make man in our image, after our likeness: and let them have dominion over the fish of the sea, and over the fowl of the air, and over the cattle, and over all the earth, and over every creeping thing that creepeth upon the earth."

Botanist: True, Zoologist, but thou hast overlooked a verse:

> "And God said, Let the earth bring forth grass, the herb yielding seed, and the fruit tree yielding fruit after his kind, whose seed is in itself, upon the earth: and it was so."

You did not read from the beginning!

Zoologist: But everything is Zoology. Are you blind? The butcher is a Zoologist who knows the anatomies of certain animals, and can cut them accordingly; the leech is a Zoologist who knows the ailments of a certain kind of animal and knows the physics which heal those ailments; the historian is a Zoologist who records the activities in the distant past of that certain kind of animal; even the tailor who cut this cloth was a Zoologist who studied my parts and patterned accordingly. Tell me something which is not Zoology!

Botanist: The brier you fell over! But let me speak of Botany. Dost thou remember, the Good Book says,

"All flesh is grass."
Do you know the meaning of that?

Zoologist: A figment of the imagination, a mere expression of speech, what more?

Botanist: Nay, friend Zoologist, much more. What do you eat?

Zoologist: Good roast beef, kidney stew, fish, fowl, and wash it all down with good brown ale.

Botanist: And did the cow that made your good roast beef live on air? And do they brew brown ale from stones?

Zoologist: I regret that I overtook you, thou speakest as a fool. Cows eat grass. And is it possible that thou hast ne'er seen ale brewed?

Botanist: But Botanists think grass is a plant. And what but plants go into the ale?

Zoologist: Nonsense, you speak as a child.

Botanist: Thank you, for of such is the kingdom of heaven.

Zoologist: I have you on the fish. They are no plant eaters.

Botanist: Hast thou ne'er heard of the Diatoms, lowly plants?

Zoologist: No, thank goodness.

Botanist: Yet they compose the grass of the sea, the floating meadows we call them.

Zoologist: And fish eat them? Stuff and nonsense!

Botanist: Either the fish eat them or the animals that hath fed of them. But what is in that bottle you carry so tenderly?

Zoologist: Cod liver oil for my wee babe. We soak him in vitamins.

Botanist: Did the cod make the vitamins?

Zoologist: Do you think they come from the Turk?

Botanist: They come from the fish's food, good Zoologist, from the plants. They are the beams of the sun captured by those lowly plants.

Zoologist: I grant you, Botanist, that animals eat plants for food. But what of it, food is eaten today and forgotten tomorrow. We, who talk, are animals. Are we not more important than mere plants?

Botanist: But, good Zoologist, tell me, which is the more important of those two legs of yours which carry you so lustily up the mountain?

Zoologist: The more important? More nonsense. They are equally so.

Botanist: And if animals cannot exist without plants, are not plants important?

Zoologist: True, good Botanist.

Botanist: I see the lights of our good friend Swartz's house. He lives a weary way from the village, to be sure. Zoologist, I trust that you agree that both my Botany and your Zoology are important, but dependent upon each other. I gather weeds as you put it, yet your pockets are full of worms and other unpleasant things. Let us go our ways together, remembering that we study not plants or animals, but life. What the one gains the other profits by. And there in the doorway is our good host, like unto a puffball himself, with spores in his ears, mycelium in his hair, and Heaven knows what in his head.

AH, THIS IS LOVE!

There's the wonderful love of a beautiful maid,
And the love of a staunch, true man.
And the love of a baby that's unafraid—
All have existed since time began.
But the most wonderful love, the love of loves,
Even greater than that of a mother,
Is the tenderest, infinite passionate love
Of one dead drunk for another!

In giving gas at college
Willie gained the useful knowledge
That if the eye would not respond to irritation
When he touched it with his finger
He was not to longer linger,
But to start at once upon the operation.
His first victim was a stranger,
Great big, brawny Texas ranger,
Who said he'd like to take a dose of gas;
Now, his earthly troubles over,
Willie lies beneath the clover,
For the Texas ranger's eye was made of glass.

—E. N. Kent in the *Desmos*

OBITUARIES

Dr. Ira Eugene Cutler

National President of Phi Sigma, 1924-28

Dr. Ira Eugene Cutler, 72, for thirty-eight years a member of the faculty of the University of Denver, died Monday, May 25, 1936 at his home, 2122 South Clayton Street, Denver, Colorado.

Dr. Cutler was born in 1863 in Putnam, Connecticut, where he received his public school education. In 1893 he was graduated from Albion College with a B.S. degree, and in 1907 from the University of Denver with the degree of M.A. In 1919 he received the honorary degree of doctor of laws from Albion College.

Dr. Cutler was a specialist in the life science and very much interested in all living things, both plant and animal. He developed several new varieties of plants, notably new varieties of corn, columbines, irises, and other flowers. He did much work in hybridizing creeper and normal fowls. Dr. Cutler was professor of zoology at the University of Denver in active service from 1898 until 1934, when he became professor emeritus. In addition to his duties as a teacher, Professor Cutler entered into the activities of the university in many ways. He was director of the glee club and leader of musical activities on the campus for many years.

Dr. Cutler was versatile, interested in many lines and successful in many. He was an artist of merit and produced many excellent pictures, both in oils and in pastels. The university depended upon him on all special occasions for arrangement of flowers and other decorations. His artistic ability is also shown by the beautiful garden and flowers at his home.

Surviving are his wife, Amelia Perkins Cutler, and five children—Alice C. Bretnall of New York; Marion F. Cutler, teacher in the Denver Public Schools; Owen P. Cutler of Ogden, Utah; Marjorie M. Cutler, assistant registrar at the University of Denver; and Laura C. Fortner of Sterling, Colorado.

Dr. Cutler was the author of many articles appearing in the scientific journals of the country, and was a member of numerous scientific societies, including the Botanical Society of America, the American Genetics association, the Society of Mammalogists, and the Colorado-Wyoming Academy of Science. He was the national president of Phi

Sigma society, honorary biological fraternity, from 1924 to 1928, and was a member of Alpha Tau Omega fraternity and the Sons of the American Revolution.

Julíus Arthur Níeuwland

Nu Chapter Honorary Member

When in 1922 Nu Chapter of Phi Sigma at Washington and Jefferson elected to honorary membership one of America's most productive botanists, the Editor of the "Midland Naturalist," it honored itself in honoring Dr. Julius A. Nieuwland of Notre Dame University. In his sudden death last June in the Chemistry Laboratory at the Catholic University of America, Phi Sigma lost one of the most distinguished of its honorary members.

Dr. Nieuwland had more than a passing interest in Phi Sigma. He attended every scientific session of the society at the Cleveland convention in 1930. One of his last non-chemical papers was "Research," contributed to the 1935 Fall issue of the "Biologist."

Dr. Nieuwland received many obituaries in the scientific press. None perhaps revealed as much of the man and the scientist as an article by Harry Sylvester appearing in the January 1932 issue of "Columbia," and reprinted here with the permission of its editor.

A LIGHT burning high in a room over a dark campus, and a man toiling in a laboratory for long hours. A stench that was almost overpowering, and an idea that was. A pair of gasometers, and a mess of test tubes. From them came, after a long time, synthetic rubber and, to a man who cared for neither, fame and wealth.

Thus, in brief, the story of Father Julius Nieuwland, scientist and priest in the Order of the Holy Cross at the University of Notre Dame, and the man to whom, in great part, the credit for the discovery of cheap synthetic rubber is due.

In the town of Hansbeke, Belgium, on February 14, 1878, Julius Aloysius Nieuwland was born. While still quite young, his parents migrated to America, settling in South Bend, Indiana, where the youngster received his preliminary education. It was while in St. Mary's grade school there that a teacher asked him for his full name. He told her in French. To her, a German nun, ''Julius Aloysius'' was merely so many gutturals. Becoming more bewildered upon repetition of the name, she finally, in despair, told him his name was ''Arthur,'' and since then he has been Julius Arthur Nieuwland, and not the Aloysius of the baptismal records at Hansbeke.

There was nothing outstanding, perhaps, to distinguish the boy from the rest of his fellows, or to indicate that he would some day be a great scientist. He did not even take a science course while a student at Notre Dame, but was graduated with the degree of Bachelor of Arts in the class of 1899. He attended Catholic University in Washington, and was ordained a priest in the Congregation of the Holy Cross in 1903.

He started teaching classes in organic chemistry and botany shortly after at Notre Dame. He has always taught, despite his fame and the recognition accorded him, for his work in the development of synthetic rubber, while probably his greatest, is not his only important achievement. He studied while teaching and, in 1911, was awarded the degree of Doctor of Science. He continued to teach, as well as going on with his own work, heading the Department of Chemistry at the university from 1918 to 1920 until succeeded by Professor Henry B. Froning. He was Dean of the College of Science, also, for a short time.

—Courtesy of The Notre Dame Alumnus

Reverend Julius Arthur Nieuwland, C.S.C.

The world knows him inasmuch as it knows anything well, for a scientist, and many of his colleagues know him merely as a great chemist. But he is more than that. He founded, some twenty years ago, the American Midland Naturalist, one of the foremost journals dealing with natural history, and has continued to edit it ever since. His work with this publication as well as his general endeavors in this field, stamp him as perhaps the country's greatest systematic botanist.

While cheap synthetic rubber was perfected by a staff of chemists connected with the company sponsoring the product, it was Father

Nieuwland who discovered the compound from which it was made, and whose work inspired others to take it and expand it further. Practically the same thing was true of Lewisite, that deadly gas an American perfected during the war, and whose discovery is sometimes supposed to have been a contributing factor to the great conflict's end, the story going that the Central Powers found that this gas was being made by the Allies, and thought it best to surrender when they did. It was this same scientist-priest, the naive, modest Father Nieuwland, who in the course of his constant experimenting with acetylene, discovered he had created a compound too poisonous to work with. At a meeting of chemists during the war to discuss how best they could aid in the struggle, Father Nieuwland had cause to mention this compound, and Lewis took it and developed it into Lewisite.

That Dr. Nieuwland should have done only the preliminary, if, nevertheless, the more important work in these two discoveries, is perhaps significant with regard to the character of what everyone but himself believes to be a great man. Indefatigable, untiring, a ceaseless worker, he more than likely saw the possibilities of his two discoveries, but scorned to go through with them, knowing that some capable scientists could develop them fully while he went on, working to find still other things which still other men would develop to their fruition. It is difficult to say what he is working on now; probably only he knows. It is safe to assume that it has to do with acetylene, in which he is the country's, if not the world's, leading authority.

The story of the finding of a means to manufacture cheap synthetic rubber covers a quarter of a century. There has been synthetic rubber made before, but it has always been expensive or inadequate to all the uses it was needed for. Some of it cost a dollar a pound to manufacture; some of it was too brittle. Duprene, the trade name for Father Nieuwland's product, is the only cheap synthetic rubber made which still has practically all the qualities of the real variety.

In his laboratory on the third floor of Chemistry Hall on the Notre Dame campus, where clusters of test tubes and weird-looking glass and metal instruments mingle with other objects as new and commonplace as an electric refrigerator, this quiet man long ago started to work with things scientific; but he specialized in acetylene. In 1906 he passed acetylene into a solution of copper and ammonium chlorides, and found that a chemical change took place, and a new substance produced which he could not isolate, but which he thought to be a gas. For fourteen years he worked on this reaction, and found that it was possible to alter the composition of the solution into which the acetylene was passed, in such a way as to give a higher yield of the new substance. To his surprise, along with the gas which he expected, an oil was produced. Another year, and he had determined the formula for this oil, finding it to be divinyl acetylene. But further work on the gas failed to reveal its composition, although he thought it to be monovinyl acetylene.

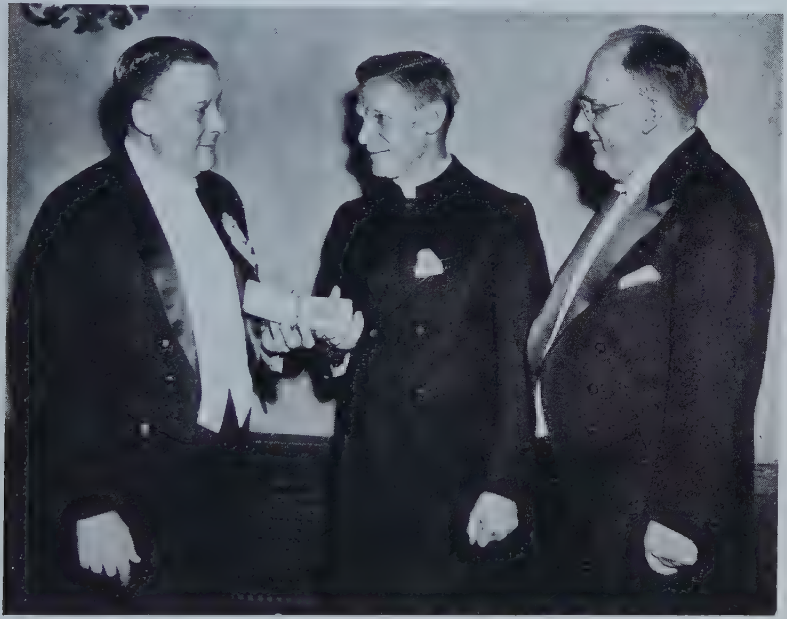
In 1923 Dr. Richard R. Vogt, also of the Department of Chemistry at Notre Dame, treated this compound of Father Nieuwland's with a vulcanizing agent and obtained a highly elastic material, somewhat similar to rubber in nature but much too plastic for practical use.

Still the work went on. To his heavy teaching schedule, and comprehensive research in his several fields, Dr. Nieuwland adds the burden of traveling to various scientific congresses and reading papers dealing with his research. At the Organic Symposium at Rochester, New York, in December 1925, he read a paper dealing with the catalytic reactions of acetylene in which he casually referred to the work done up to date on the new reaction. The duPont people had been interested in the production of synthetic rubber for sometime, and saw the possibility of divinyl acetylene as a material from which to synthesize rubber. They made arrangements with the scientist-priest whereby they might take over the development of the new substance.

A long time passed and many men worked at the task, but with scant success. Often the idea of giving up the work was contemplated, but with true scientific spirit it was kept going. In time a rubber was produced from this divinyl acetylene, but it had a low elasticity, became brittle with age, and was generally unsatisfactory. But this extensive work with divinyl acetylene did not go for naught. By a controlled polymerization of the compound, a process which changes the molecular weight of the substance without changing the elements constituting it or their proportion, a synthetic drying oil was produced, which has properties making it extremely valuable.

While this work was in process, the gas which Father Nieuwland had noticed in his early work, was being investigated by the Jackson Laboratories of the duPont firm, and as he had suspected, it was found to be monovinyl acetylene. Since substantial amounts of this substance were formed along with the divinyl acetylene, its possible use as a starting material for the making of synthetic rubber occurred to those working with it, and caused them to investigate further. It was treated with hydrochloric acid and gave a compound called chlorprene, which, treated with suitable reagents, polymerized to form a suitable rubber. The molecules "turned and bit their neighbors' tails," was the unscientific if graphic way Thomas H. Vaughn, Father Nieuwland's young assistant, put the chemical reaction taking place in the formation of synthetic rubber.

It was a dramatic scene that was enacted at the Akron University Club Auditorium in Akron, Ohio, on the evening of November 2. Here the rubber section of the American Chemical Society gathered in a meeting



—Courtesy of The Notre Dame Alumnus

FATHER NIEUWLAND RECEIVES NICHOLS MEDAL
Highest Award of American Chemical Society

unique inasmuch as none of its members knew what its object was. The committee arranging the program knew merely that some new product, of revolutionary nature, and of value to the rubber industry, was to be described by the duPont chemists, three of whom were to read the papers.

Speculation was rife, and an undercurrent of something epic about to occur ran through the room. Dr. F. B. Downing arose and described the process for the manufacture of the basic material used in the preparation of synthetic rubber, calling for the usage of coal, salt, limestone. Unless this basic material could be manufactured cheaply, synthetic rubber made from it was not worth while. It could be manufactured cheaply. The speaker finished, and a sustained buzz ran through the assembly. Surely no one had discovered a practical synthetic rubber? Someone or ones had merely accomplished some preliminary steps which might or might not, probably the latter, lead to its manufacture.

Dr. Downing was followed by his co-workers, Drs. Carothers and Williams, who told of the preparation of rubber from Father Nieuwland's compound, and four hundred men knew that years of labor, and the work of many others who had failed to produce synthetic rubber, did not appear quite so futile now. To show that it was not merely a theoretical process they were describing, the three chemists showed a number of articles made from Duprene, the trade name of the new rubber. They also pointed out some of its superior qualities, for while only a shade less durable than the natural variety, it is nevertheless superior to it in many ways.

It has a number of commercially valuable qualities which will supplement the present uses of natural rubber. One of the most valuable of these properties is that it is much more resistant than natural rubber to the swelling action of gasoline, kerosene and other solvents notoriously harmful to rubber. Another interesting feature of it is that it can be vulcanized by heat alone, whereas it is necessary to add sulphur in order to vulcanize natural rubber. Again, an artificial latex may be made by emulsifying chloroprene in water with the aid of soap. The artificial latex is a milk-like liquid consisting of particles of synthetic rubber suspended in water. This latex may be applied to the surface of articles, and after drying, the surface is covered with a sheet of fully vulcanized rubber. This Duprene latex differs radically from natural latex in that its penetrating power is greater, and it becomes possible to impregnate many porous materials with it that cannot be impregnated with natural rubber latex. It is also believed that treatment by a liquid made from Duprene and applied to silk will increase its wearing power.

And so the news went forth from the meeting at Akron, and the quiet priest went home to Notre Dame unmoved by the praise and adulation he had received. But the world was not through with him. It wants to know about its great men, and from all parts of the country came reporters to the crowded laboratory on the third floor of Chemistry Hall at Notre Dame. Quite likely many of them were disappointed. They were used to finding their "great men" surrounded by corps of secretaries and assistants. They were used to seeing radio announcers and other "great men" in the midst of a veritable cordon of yes-men and office boys. They were used to being allowed a few moments of the great men's precious time. But on the quiet campus beneath the golden dome they found Nieuwland of Notre Dame, a very plain, a very quiet, and a little bit tired middle-aged man.

There was no great group of assistants about him. The only one they could see was Tom Vaughn, little more than a boy, his assistant, and holder of a duPont fellowship at the university. Father Nieuwland answered their questions patiently, explaining, showing them his laboratories and work-rooms. They departed, but others came. Many of them gave him entire credit for the discovery. He was then at pains to tell others how the chemists of the duPont people had done a great part of the work. But still, so modest the man, many yet thought this statement of his but another manifestation of his character.

The long stream of information seekers continued, and he found it hard to get back to his work, so frequent the interruptions. Finally Vaughn had to take over the explanation of the affair, and Father Nieuwland got back to his acetylene, his botany and his teaching.

To see him walking about the campus, one would scarcely take him for a distinguished scientist. His cassock is stained with chemicals. He smokes a short, black pipe and, if he happens to have been working most of the night in his laboratory, a stubble of beard will adorn his cheek. He strolls quietly about the campus at night for a little air. He does pretty much of just what he pleases, eating when he wants to, sleeping when he cares to. But he has gotten away from this irregularity of habit more or less of late. Long labors in his youth have sapped his strength somewhat, and now he works only until eleven o'clock of nights, rising at seven to say Mass and break his fast.

The claim of the sophisticate that the scientist is usually completely one-sided, and ignorant of almost anything but his own field, finds a refutation in this man. He can talk, should one be so fortunate as to engage him in conversation, on practically any subject, and in eight languages. Home football games usually find him at them, the stubby black pipe between his teeth, hatless, only his old cassock between him and the wind and weather. He has published a multitude of chemical and botanical papers, while his sundry minor devices to aid in his work are unique. One of them he evolved when a laborious and costly experiment went to naught because he couldn't open a door as he approached it, hands full of apparatus. He invented a treadle, and now he opens the door of his room with it.

Once started on a thing it is difficult for him to stay away from it, thus accounting for the light students returning as late as midnight see in the dark pile of Chemistry Hall. In addition to his own work he helps those graduate students who come to do research work, and all the while carries a full teaching schedule, edits his magazine and writes his treatises and papers.

A remarkable man; a man who, unlike others, to whom the application of the word great makes them seem top-heavy, successfully bears its burden. Even those who were not impressed by the man when they came to interview him, could not consider him anything else but great. His co-workers, the students he teaches, the scientists and botanists of the world, all consider him a great man. In short, everyone does. Everyone but himself.

VELLY RED FACE

A guest at a banquet took pains to make himself agreeable to a Chinaman sitting next to him.

Somewhat at a loss for small talk he ventured, after the first course, to inquire, "Likee soupee?"

There was no reply except a genial beam. After the next course he followed up his first opening with "Likee fishee?" This evoked a still more genial beam.

Later in the evening the visitor from the Far East responded to a toast in perfect English.

On resuming his seat he asked his discomfited neighbor, "Likee speechee?"

—*Ottawa Citizen*

KNEW HER P's AND Q's

Detroit traffic cop, bawling out an unassuming lady motorist: "Don't you know what I mean when I hold up my hand?"

She, meekly: "I ought to. I have been a school teacher for twenty-five years."

—*Typing Tips*

ONE OF CONANT'S "ROVING" PROFESSORS?

J. L. W., associate professor of secondary education at Toledo, Ohio, recently walked into a University of Toledo (Ohio) classroom and started expounding the principles of psychology. For fifteen minutes he spoke. Then he asked the class a question—no answer. Another question—still no answer.

"Doesn't anyone in this class ever study psychology?" he asked.

"No, sir," was the reply. "This is an advanced English class."

—*Guide Post*

EDITORIALS

Conventions, Past and Future

THE Program of scientific papers sponsored and staged during the Phi Sigma convention at St. Louis last year was conspicuous among the sessions of all other organizations for its length, variety and impossible location. Regarding all these three factors there was at the time, and has been since, considerable discussion.

The location of the scientific session can easily be arranged in coming years to be close to that of the Botanical and Zoological societies, enabling all interested members of the AAAS to have better access to the papers they may wish to hear. It was, through no fault of Phi Sigma, that an indecisive administration of the American Association for the Advancement of Science at the last moment changed meeting places. (Even as this year it changed, not only meeting places, but even meeting cities, moving from Washington to Atlantic City!)

The length and the variety of the Phi Sigma scientific session both came in for more valid criticism. Staid and experienced professors in the biological sciences expressed their regrets that so many really valuable and interesting papers were presented away from the session of the national organizations. Young men and women entering the biological field by every right should present their work, where they will obtain the recognition they deserve. Some professors even went so far as to state that Phi Sigma was leading a separatist movement, drawing young research workers away from, instead of into, the very organization which most needed their cooperation.

About all of which enthusiastic members of Phi Sigma are not so sure. It certainly was not the intention of past members of the organization who initiated these sessions to start a separatist movement. The scientific sessions were inaugurated to give those junior scientists who were just beginning their careers, or had projects in progress and not completed, an opportunity to present their work to a not too critical audience. It was also felt that this plan would be facilitated by the gathering of delegates from all sections of the country for the sessions of the biennial conventions. It must also be remembered that the officers of Phi Sigma not only did not inaugurate the scientific session on their own initiative, but that they were asked to do so by the officers of The American Association for the Advancement of Science.

That the idea has proven successful beyond the most enthusiastic expectations of the past is not the fault of Phi Sigma. That the program has grown too important and too heavy is not for us to blame ourselves. It is for Phi Sigma now to respond to this unusual situation and to reorganize the procedure of our scientific sessions.

The personal opinion of the Editor of the Biologist may not be worth very much, but at least it is the opinion of one member of the organization. It is presented here, and both National and Chapter officers may take it for what it may be worth.

Our problem in Phi Sigma is complex. We are bound by a gentleman's agreement with the AAAS to hold the scientific session during our biennial conventions. On the other hand, it must be remembered that Phi Sigma to a large share, finances the attendance of the Chapter delegates at the convention and scientific sessions. Finally, it must not be forgotten that of all the papers read in any session of the St. Louis convention those before Phi Sigma received the most publicity. ''Science Service'' had a representative at nearly every session. This was in addition to the almost international publicity extended to the splendid example of scientific humor in Dr. Causey's address at the Phi Sigma banquet. But Phi Sigma does not exist for the publicity it can get. It can be, it has been, generous enough to finance the attendance of chapter delegates who read no papers in its sessions. Why cannot something like the following be its future procedure:

A. Hold the biennial or triennial convention and scientific session, as far as possible financing the attendance of delegates as before.

B. Hold the sessions close to those of the Biological organizations.

C. Limit the papers read in the Phi Sigma sessions mostly to those of undergraduates and such beginning research as is not ready for the critical study of the national groups.

D. Sponsor the papers of graduate students and advanced undergraduates in the sessions of the other national organizations. This should be easy to do. There are enough professional members of Phi Sigma in every one of these organizations who might be persuaded to lend their names to the usual procedure employed in announcing the papers to be read: ''X—, a paper by Mr. Y, introduced by Dr. Z.''

By some such procedure Phi Sigma would be performing still another service to American biology, acting as a clearing house, and routing the papers to their proper organization. Of course, this could only be accomplished if the chapter officers were actively willing to insure that the abstracts of all papers to be presented were in the hands of the National Secretary at least one month in advance of the national meetings.

And if there should be some publicity seeking die-hards within Phi Sigma who lament our assisting other organizations, perhaps all the papers to be read by Phi Sigma members before other organizations could still be listed in our share of the program with an appended: "To be read before the American Society of ——ists."

Some decision must soon be reached on these matters. They deserve discussion in the chapters.

Beta Scores

WHEN the August 15th issue of "The Michigan Alumnus" reported the June meeting of the university regents, there was inconspicuously included the acceptance with thanks of a gift of $100.00 to be used as a loan fund from Beta Chapter of the Phi Sigma Society through Mr. T. P. Hames, President. Thus, quietly and unostentatiously the good work goes on. Beta Chapter is to be congratulated on the generosity, wisdom and foresight which prompted the decision to turn this fund over to the university regents. If more chapters set some such goal as their objective, and slowly or rapidly built up their exchequer until some such sum were accumulated (and gradually added to!) they would be establishing themselves not only in their own self-respect, but also in the good graces of the campus authorities.

Signs are not lacking in the fraternity world that the process of collegiate attrition is not waning, it is just commencing, and those unproductive organizations which exist for honor and glory, self-esteem and self-aggrandizement have set their feet on but one way, the way *OUT!* More than ever the American public is beginning to be aroused to the uselessness of many of its traditional institutions. The popular policy of our nation is "Show me!" Which is a pretty good philosophy of values, since it was Someone a very long time ago Who said: "By their fruits ye shall know them."

Congratulations Beta!

Unchange!

THE change of format planned for this issue and announced last Spring has obviously not taken place. Thereby hangs the tale of our late appearance. Plans for the prospective shift to a larger, thinner, type of magazine,—somewhat like "*Time*" of the "Literary Digest"—were completed months ago. The approval of the National Council was secured. The material for this issue was ready for the printer, and the instructions to that most astute gentleman were just about complete. Then your Editor made a last minute survey of the situation, in the hope of some suggestion to further improve the appearance of the new issue. He carefully explained his plans to a group of fellow professors and met with,—not stony indifference,—but, worse than that,—absolute opposition! Your editor is on some points a hard-boiled individual,—and not ordinarily disposed to let the opinions, wise or otherwise, of a group of his friends sway him too easily from a course of action long contemplated and carefully worked out. But one single smashing argument from the head of an English department settled everything for good and all. Said he: "Why change? I've always admired the effective appearance of 'The Biologist'." Now you are trying to change it to another shape, just when some of the better magazines are changing to your size. Look at "The Reader's Digest," and the others like it. Why even the latest of our new magazines "Coronet" took your size!" That settled it. This Editor no longer desires to change.

Apologies!

October 22, 1936

My dear Dr. Keefe:

It has been called to my attention that all of Psi Chapter's papers that were presented at the Phi Sigma Convention in St. Louis last December were attributed, in the last Biologist (March-May 1936), to Alpha Theta Chapter of Washington State College at Pullman Washington, an institution about 350 miles east of this campus.

If it is possible, will you please rectify this mistake in the next Biologist?

Sincerely yours,

Charles L. Harding,
Secretary Psi Chapter.

The apologies of the Editor are due to all the members of Psi Chapter who have been so deprived of the credit that is due to them. It was a mistake, there can be no explanation. The Editor apologizes and trusts that the apology is accepted.

CHAPTER NEWS LETTERS

Beta

President—Wayne W. Whitaker, Zoology Department, University of Michigan, Ann Arbor, Michigan.
Vice-President—Irving J. Cantrall, University Museums Bldg., Ann Arbor, Michigan.
Recording Secretary—Lois Jotter, Botany Department, University of Michigan, Ann Arbor, Michigan.
Corresponding Secretary—Joseph P. Harris, Jr., Zoology Department, University of Michigan, Ann Arbor, Michigan.
Treasurer—William Stickel, Zoology Department, University of Michigan, Ann Arbor, Michigan.

The closing months of the spring of 1936 brought the members of the Beta Chapter of Phi Sigma several very interesting and enlightening programs.

On April 22, Miss Crystal Thompson, Curator of Visual Education of the Museum of Zoology, University of Michigan, spoke on ''The Methods of Museum Exhibits''. Miss Thompson outlined the methods used by that department in the selection of exhibits in relation to the needs and demands of the different classes of observers. A surprising fact came to light, namely that the exhibits most difficult to analyse yielded the best results. Following Miss Thompson's talk, the members present heartily took advantage of the opportunity to see the exhibits discussed.

The regular spring initiation of Beta Chapter was held April 22, 1936. We were very fortunate in having for the speaker of the evening, Prof. H. H. Bartlett of the Department of Botany. Prof. Bartlett is one of Beta's first members (Beta '17). He is well versed in Anthropology, Ethnology, and Art as well as Botany. His account of his experiences in the Philippine Islands as exchange Professor at The University of Manilla 1934-1935, was therefore unusually interesting. Immediately after his talk, Prof. Bartlett added to the feeling and excitement of the initiation by aiding with the ceremony. Each and all of those members present felt a distinct and closer unity with the older members of Beta Chapter who so ably set down the basic ideals and standards which we follow to-day.

The eighteen initiates to be honored in this manner were:

Abegg, Roland
Allen, Robert
Anderson, Nolan
Atkinson, William

Houghtaling, Helen
Kaufman, William
Linberg, Robert
Madsen, Grace

Cancell, Benton
Campbell, Robert
Devney, Dorothy
Gilreath, Ruth
Herbold, Elsie
Marsh, Martha
Mosby, Henry
Perlmutter, Alfred
Welsh, Stanley
Wharton, Mary

Dr. Frank N. Blanchard of the Department of Zoology, University of Michigan, on May 5, the last meeting of the year, spoke on his recent trip through southwestern United States. Dr. Blanchard emphasized his experiences with amateur biologist friends. His talk was interestingly illustrated with lantern slides.

The annual spring banquet took place May 27, 1936 at the University of Michigan Union. Following the inauguration of the officers for the year 1936-1937, Prof. Bradley M. Patten, head of the department of Anatomy and Embryology, University of Michigan Medical School, addressed Beta Chapter on the subject ''Micro-moving Pictures Applied to the Study of Living Embryos''. Dr. Patten has worked for several years on this phase of the study of embryos. In his address, the technique of aseptically removing avian embryos from the egg and transferring them to sealed glass boxes in such a manner that the embryo would continue to grow and develop; as well as the long and intricate task of photographing the embryos were outlined. One reel of moving pictures showed the operations that were necessary to make the films. Two other reels were devoted to the development of chick and wren embryos from early stages to the hatching of the young bird.

Beta Chapter is pleased to inform all Phi Sigma members that Beta's $100 loan fund has been duly accepted by the Board of Regents of the University of Michigan. With the approval of the Student Loan Committee, any member of Phi Sigma in good standing in his or her chapter may borrow $50. This is to be used to defray expenses of this person at the University of Michigan Biological Station. Application may be made through either Dr. C. S. Yoakum, Dean of the Graduate School, or Dr. G. R. La Rue, Director of the Biological Station.

With this last announcement Beta Chapter closes a most fruitful and gratifying year.

Miss Edith R. Force was initiated into Beta Chapter, May 29, 1936.

IRVING J. CANTRALL,
Vice-President.

Epsilon

President—Wayne Kraxberger, 2041 South Josephine St., Denver, Colorado.
Vice-President—Harlano Close, 2050 So. Gaylord, Denver, Colorado.
Secretary—Carol Cox, 869 So. Race St., Denver, Colorado.
Treasurer—Theodore Sowers, 2438 Harlan Blvd., Edgewater, Colorado.

Pledging ceremonies for the new candidates of Epsilon chapter of Phi Sigma were held at an open meeting, November 28, 1936, at the home of Professor Humphrey G. Owen, 2140 South University Avenue.

The speaker of the evening was Mr. Robert J. Neidrach, Curator of Ornithology, of the Colorado Museum of Natural History. His subject was "Birds and Mammals of Colorado", illustrated by motion pictures.

The new pledges are:

Margaret Tietz
Corrine Anthony
Howard Olson
Dorothy Hixson
Paul Stidham
Catherine Baxter
Virginia Elkins
Edgar Warren

Hugh Capps and Charles Hansen, members of the pledge class of the spring of '36, will be initiated with the new pledge group.

Dr. Margaret Fuller Boos, associate professor of geology and geography at the University of Denver, has accepted the invitation of Epsilon chapter of Phi Sigma to membership.

Dr. Boos received her B.S. degree in geology from Northwestern University and her M.S. and Ph.D. degrees also in geology from the University of Chicago. At Northwestern University she was a major in botany and geology, and at this institution she conducted classes in geology and geography for seven years. She was acting Park Naturalist of the Rocky Mountain National Park for two years. Three years before coming to Denver, Dr. Boos was employed by the Phillips Petroleum Company.

Dr. Boos' chief interest is field work pertaining to the Rocky Mountain Front Range. Twenty publications dealing with the geology of the Front Range have been published by her.

Mrs. Frances D. Becker, instructor in zoology and former president of Epsilon chapter, spent the past summer at the Hopkins Marine Station of Stanford University.

James D. Dutcher has been granted a research fellowship in the Department of Biochemistry at Columbia University for the academic year 1936-37.

Wayne W. Kraxberger, Chief Field Assistant of the Department of Anthropology at the University of Denver, after returning from Dr. E.

B. Renaud's third Denver-Wyoming Archaeological Expedition in July, 1936, became a member of the staff of Dr. Frank H. H. Roberts, Jr., archaeologist for the Smithsonian Institution at Washington, D. C. Dr. Roberts is investigating the Lindenmaier site in northern Colorado, which belongs to the so-called "Folsom cultural complex". The summer's work was terminated September 5, 1936.

Miss Cecelia E. Evans, graduate student of anthropology at the University of Denver, is working on her master's thesis which will be "The Mythology of the North American Indians". Miss Evans, past treasurer of Phi Sigma, Epsilon chapter, was a member of Dr. Renaud's Wyoming Expedition in June of 1936.

The Colorado-Wyoming Academy of Science will hold its annual meeting on the Denver University Campus, November 27-28, 1936. Members of the Academy will present scientific papers and exhibits.

The Colorado Archaeology Society will hold its annual meeting in the Museum of Anthropology at the University of Denver, November 27-28. The original chapter of this organization was established at Western State College, Gunnison, Colorado, in 1935 by Dr. C. T. Hurst.

Two students received the Master of Arts degree last August in the Department of Botany. Harland Whitwell, of Dickinson, South Dakota, studied "Certain Climatic Factors of Plant Growth in the Foothill, Montane, and Alpine Zones of the Rocky Mountain National Park"; Harvey Cole of Nebraska City, Nebraska, wrote on "The Root Habits of Certain Common Weeds of Eastern Nebraska". These two theses, together with half a dozen others completed recently, are being shortened and revised for publication.

The herbarium is growing rapidly through the exchange of sheets of Colorado plants for those of other states and countries. The botanical library has recently added a number of books of historical interest to students of plant science, of which the oldest is a copy of Matthiolus' "Commentaries on Diascorides", published in 1627.

DENVER UNIVERSITY SUMMER FIELD WORK, 1936

The party left Denver on June 15th. Headquarters were established at Green River, Wyoming. The first week was occupied in exploring the southwestern corner of Wyoming to the Utah line. Thirty-one sites were added to the nine sites previously found in the same region, several of them of great antiquity. A large sampling of stone artifacts was collected for laboratory study in the fall. Last year the east-to-west extension of the culture had been established. This season the north-to-south limits were reached. The second week was occupied in complementary field work in southern and southeastern Wyoming, bringing in thirty more sites. The expedition returned to Denver the 26th of June.

An anthropological trip was undertaken by Dr. Renaud and assistant Sowers between July 6th and 11th. The principal purpose was to examine the extensive collection of Mrs. T. C. Middleswart of Bridgeport, Nebraska, because these artifacts came from sites previously surveyed in southwestern Wyoming. The exact locations of these sites were established on the map and eleven new sites were added to the survey. The northeastern corner of Nebraska was traversed in order to connect up two archaeological trips previously taken in that region. The Palaeontological Expedition of the University of Nebraska was joined to examine the prehistoric hearth found by Mr. Bertram Schultz, below an old lake level, north of Crawford, Nebraska. From there we went to Provo and Edgemont, South Dakota, in order to look up petroglyphic sites near the Black Hills.

For the sixth season, a summer archaeology class was organized, and established its headquarters at Santa Fe, New Mexico. Eight students took the morning lecture course and individual research. Lectures were given every morning and field trips were taken Wednesday afternoon and all day Saturday. The course lasted three weeks, and gave a concrete knowledge of the Pueblo Culture.

Recent publications of Dr. E. B. Renaud, professor of Anthropology at the University of Denver, includes the following:

1—"Pictographs and Petroglyphs of the High Western Plains" Eighth Report of the "Archaeological Survey of the High Western Plains". University of Denver—Department of Anthropology—Sept. '36.

This is the first time that a publication of pictographs and petroglyphs of this region has been presented. The report contains the only pictographic chronology to be found upon the subject.

2—"Southern Wyoming and Southwestern South Dakota" Seventh Report of the "Archaeological Survey of the High Western Plains. University of Denver—Department of Anthropology—Jan. 1936.

The Archaeological Survey of the High Western Plains, conducted by the Department of Anthropology of the University of Denver, in the course of the past seven years, gathered in the states visited a few stone artifacts recalling the Early Palaeolithic "coups-de-poing" or hand-axes, a larger number of uniface, flake-tools of general Mousterian type, and also a good many blade implements similar to those of European Upper Palaeolithic. Last summer was the first time that a clear case of association of Early and Late Chellean, Acheulean, Clactonian and Mousterian industries, was found and recognized in this part of the world, without mixture of more recent, although prehistoric, Indian specimens.

3—"Stations Palaeolithiques du Sud-Ouest du Wyoming" (Etats-Unis d'Amerique)
Revue anthropologique—Paris, July-September, 1936.

This is the French presentation of the Palaeolithic Stations of Southwest Wyoming.

MOUNT EVANS HIGH ALTITUDE LABORATORY

During the past summer the University of Denver and the Massachusetts Institute of Technology have cooperated in the erection of a High Altitude Laboratory on the summit of Mount Evans, (14,260 feet). The laboratory is readily accessible by motor highway, lying 60 miles west of Denver, and is the highest permanent station in the world. It has two rooms, each 22x22 feet, and provides comfortable living accommodations for eight men. Construction is of wood, with a copper roof.

While intended primarily for cosmic ray research, the laboratory will also be available, to the limit of its facilities, for investigation in the field of physiology and medicine. The need for such a station has long been recognized; it is hoped that the interest in high altitude phenomena and the demand for space by competent investigators will in time make possible a more pretentious program and the construction of a larger building.

The following persons were initiated into Epsilon Chapter April 1, 1936:

Ball, William H.
Close, Harland T.
Cox, Carol
Eddy, Harry Launcelot
Huffman, Samuel Edgar
Kraxberger, Wayne W.
Sowers, Theodore Carl
Wittmeyer, John Gray

Fred E. D'Amour,
Department of Zoology,
University of Denver.

Zeta

President—S. S. Atwood, Biology Bldg., University of Wisconsin, Madison, Wisconsin.
Vice-President—C. A. Bundle, Biology Bldg., University of Wisconsin, Madison, Wisconsin.
Corresponding Secretary—G. E. Gould, Biology Bldg., University of Wisconsin, Madison, Wisconsin.
Recording Secretary—O. A. Bushnell, Agric. Hall, University of Wisconsin, Madison, Wisconsin.
Treasurer—H. R. Bird, Agric. Chemistry Bldg., University of Wisconsin, Madison, Wisconsin.
Editor—A. E. Zermuehlen, Old Soils Bldg., University of Wisconsin, Madison, Wisconsin.

Eta

President—Fred H. Glenny, 1148 Linden Ave., Akron, Ohio.
Vice-President—Grace Gerson, 940 W. Exchange St., Akron, Ohio.
Secretary—Elsie B. Widick, 109 Kent Court, Akron, Ohio.
Treasurer—Joseph Eckert, 882 Peckham St., Akron, Ohio.

Dr. Walter C. Kraatz, Zeta: Professor of Biology, is working on the Biological Survey of Turkeyfoot Lake, with chief emphasis on the Plankton and Bottom Organisms.

R. D. Fox, Eta: Assistant Professor of Bacteriology, has been appointed to the Commission for the establishment of a Society of American Bacteriologists for Ohio; he has been reappointed to the American Commission for the Standardization of Biologic Stains.

Fred H. Glenny, Eta: Graduate Assistant in Biology, continued the study of the Gross Anatomy of the Brain of *Heteroperca incisor* during the summer. At present he is studying the Morphology and Phylogeny of Algae.

Eleanor Mueller is working on the pathogenicity of Moniliasis for rabbits. In addition to this work she is assisting Dr. Walter C. Kraatz, Professor of Biology, in his work on the Plankton Survey of the Portage Lakes.

ALUMNI NEWS

"Microscopic study of the superficial cerebral vessels of the rabbit by means of a permanently installed transparent cranial chamber", by N. E. Wentsler, Eta '33; and "A new transparent chamber for exteriorizing a loop of intestine and its mesentery", by H. A. Zintel, Eta '34 appeare in Vol. 66, No. 4 of *The Anatomical Records*, November 1936.

Clarence Witzberger, Eta '25, has been appointed Assistant Professor of Pediatrics at Flower Hospital in New York City.

John C. Van Sickle, Eta '35 is working with Dr. Kraatz on Bottom Organisms. Although Mr. Van Sickle is not attending the University regularly this year, he has decided to continue his work in Zoology.

Ferdinand Gutierriez, Eta '36, sailed for the Philippine Islands on September 30, where he is to take a position with the Philippine National Health Service.

Theta

President—J. T. Wilkinson, Zoology Dept., Michigan State College, East Lansing, Michigan.
Vice-President—R. Pennell, Bacteriology Dept., Michigan State College, East Lansing, Michigan.
Secretary—B. H. Grigsby, Botany Dept., Michigan State College, East Lansing, Michigan.
Treasurer—O. J. Sorensen, Bacteriology Dept., Michigan State College, East Lansing, Michigan.

Iota

President—Russell J. Seibert, Theta Xi House, Washington Univ., St. Louis, Missouri.
Vice-President—Priscilla Chinn, Zoology Dept., Washington Univ., St. Louis, Missouri.
Secretary—Ruth E. Peck, Missouri Botanical Garden, St. Louis, Missouri.
Treasurer—David F. Waugh, 3671 Humphrey St. Louis, Missouri.

Iota Chapter started its year's activities with a meeting in October. Dr. Carroll W. Dodge of the Botany Department gave an illustrated talk on his explorations in Costa Rica, with particular emphasis on the conditions on bananna plantations and cattle ranches.

Last April we initiated ten new members at a banquet. The speaker for the occasion was Dr. Park J. White, of the Washington University Medical School, who spoke on "The Social Aspects of Heredity."

Our annual Phi Sigma picnic was held in Forest Park on May 23. Most of the afternoon was spent playing indoor baseball. A large quantity of food was provided and consumed. New officers for the coming year were elected at this meeting.

The following persons were initiated into Iota Chapter, April 22, 1936:

Albert, Bernice
Baughman, Jack L.
Dassler, Margaret Lee
Fischer, Jean
Letterman, Gordon S.
Pavlick, Earl
Rau, Phil
Reller, Helen
Sachar, Leo A.
Schmitz, Betty

Ruth E. Peck, *Secretary.*

Kappa

President—Lewis Coriell, Dept. of Bacteriology, University of Kansas, Lawrence, Kansas.
Vice-President—Charles Wolfson, Dept. of Zoology, University of Kansas, Lawrence, Kansas.
Secretary—Rufus Thompson, Dept. of Botany, University of Kansas, Lawrence, Kansas.
Treasurer—Mr. Allan Jay, Dept. of Bacteriology, University of Kansas, Lawrence, Kansas.

Lambda

President—George D. Scott, 339 So. 5th St. E., Missoula, Montana.
Vice-President—William H. Trosper, 405 So. 3rd St. W., Missoula, Montana.
Secretary—Terrill D. Stenens, 913 Beckwith Ave., Missoula, Montana.
Treasurer—Helena L. Eck, 539 University Ave., Missoula, Montana.

Mu

President—Thomas G. Aitken, 112 Agriculture Hall, University of California, Berkeley, California.
Vice-President—Robert L. Kitchel, 112 Agriculture Hall, University of California, Berkeley, California.
Treasurer—Kathryn Heck, 2444 Virginia St., (Biochemistry), Berkeley, California.
Secretary—Dorothy C. Morrell, 2045 Life Sciences Bldg., University of California, Berkeley, California.

Mu chapter of Phi Sigma began the semester's activities with an evening meeting at which Colonel G. A. Skinner, a retired member of the U. S. Army Medical Corps, gave an interesting talk on his experiences in the Philippines during the early part of this century. Refreshments were served by our excellent Refreshment Committee.

Between the first and second meetings proposed new members were sent in to the secretary.

The second meeting was also an evening meeting. Dr. Richard Eakin spoke on his experiences while studying in Germany. He also answered many questions and gave us a somewhat different picture of Germany than that which one usually obtains from newspapers. Election of new members was held.

Our initiation banquet will be held on November eleventh. Our last meeting of the semester will be business and social meeting, with dancing afterwards.

DOROTHY MORRELL, *Secretary*.

Nu

President—Edwin Pierce Albright, Hays Hall, Washington, Pennsylvania.
Vice-President—Robert W. Kline, Phi Gamma Delta House, Washington, Pennsylvania.
Secretary—S. N. Kelso, 30 W. College St., Canonsburg, Pennsylvania.
Treasurer—S. N. Kelso, 30 W. College St., Canonsburg, Pennsylvania.

Nu chapter opened the 1936-37 season on October 6 with the welcome of nine new members. These men were extended bids and initiated in the Spring of '36 because of the small number of actives who would be back at school this year. The nine new members are:

J. W. Barnhart
B. H. Berman
F. G. Christopher
R. B. Donaldson
W. F. Ewing
A. M. Iams
R. M. Kiskaddon
A. H. Logan, Jr.
W. M. McConahey, Jr.

Our chapter this year is composed of thirteen members.

PI

President—Miss Blanche Miller, Biology Department, Agnes Scott College, Decatur, Georgia.
Vice-President—Don Eyles, Biology Department, Emory University, Emory University, Georgia.
Secretary—H. Eugene Brown, Emory University, Georgia.
Treasurer—Norman H. Giles, Biology Department, Emory University, Emory University, Georgia.

Pi Chapter is glad to welcome back Mr. W. B. Redmond who has just returned from a year's leave of absence which he spent doing graduate work at the University of Chicago.

Mr. Nelson T. Spratt, a former president of Pi Chapter, has been awarded a fellowship for graduate study at the University of Rochester. Mr. Spratt spent the summer studying at the Marine Biological Laboratories at Woods Hole, Massachusetts.

Professor R. C. Rhodes has succeeded in culturing Heteronema klebsii, the fifth of the seven species which Prof. Rhodes has cultured.

The following are recent initiates of Pi Chapter:

Miss Jean Walker
Miss Venetia Cork
Dean Roberts
H. Eugene Brown

Rho

President—Ralph W. Dexter, 203 Exp. Zoology Lab., Champaign, Illinois.
Vice-President—Howard L. Gravitt, 101 Exp. Zoology Lab., Champaign, Illinois.
Secretary—Katherine Kinsel, 200 Natural History, University of Illinois, Urbana, Illinois.
Treasurer—E. C. Danner, 101 Exp. Zoology Lab., Champaign, Illinois.

Rho Chapter at the University of Illinois presents the following new members initiated May 14, 1936:

Faculty members
Dr. Milicent Hathaway whose work is in Physiological chemistry
Dr. Frank A. Brown of the Zoology department
Dr. B. Vincent Hall, also of Zoology

Active members
Walter H. Brown
Robert V. Drexler
Paul C. Lemon
William M. Marberry
Margaret Middleton
Malcolm S. Ferguson
Dr. John B. Ruyle, D.D.
Robert J. Schoffman
William A. Summers
Eugene Ray

The initiation was held at the Southern Tea Room, close to the campus, and was followed by the annual spring banquet over which Dr. Fred W. Tanner of the Bacteriology Department presided. For the purpose of acquainting the old members with the initiates, the latter were asked to amuse us with short humorous poems and anecdotes of a biological nature. Dr. W. M. Luce then provided a talk of a more serious nature, his subject being "The application of genetics to human affairs". Following this Dr. H. J. Fuller of the botany department spoke on "The seventh sense". It might be added that the seventh sense, one needed by all scientists and possessed by some few, is the sense of humor. Musical selections served as a pleasant interlude in the middle of the program.

One change of officers for the coming year is to be announced. Edwin C. Danner, treasurer, has left the university to teach zoology at the Western Union College, Le Mars, Iowa. Virginia Gangstad has been appointed to succeed him.

Another recent loss is that of Paul Lemon who resigned his graduate assistantship recently to take up duties with the government as Junior Range Examiner at Custer, South Dakota.

Rho's programs last year tried to combine the various representative departments and to combine both student and faculty addresses. A similar plan is to be followed this year with the first meeting devoted to biology in general as seen at the Harvard Tercentennial, and the subsequent meetings to rotate between the different departments.

The following persons were initiated into Rho Chapter, May 14, 1936:

Brown, Frank Arthur, Jr.
Brown, Walter Howard
Drexler, Robert Virgil
Ferguson, Malcolm Stuart
Hall, Benjamin Vincent—faculty
Hathaway, Milicent Louise—faculty
Lemon, Paul Clipfell
Marberry, William Marvin
Middleton, Margaret
Ray, Eugene
Ruyle, John Bryan
Schoffman, Robert John
Summers, William Allen

KATHERINE KINSEL, *Secretary.*

Sigma

President—J. D. Kilby, Biology Dept., University of Florida, Gainesville, Florida.
Vice-President—A. M. Laessle, Botany Dept., University of Florida, Gainesville, Florida.
Secretary—H. H. Hobbs, Jr., Biology Dept., University of Florida, Gainesville, Florida.

Tau

President—J. Woodrow Wilson, Zoology Dept., Duke University, Durham, North Carolina.
Vice-President—Randolph Boggess, Botany Dept., Duke University, Durham, North Carolina.
Secretary—Sarah Culbreth, Zoology Dept., Duke University, Durham, North Carolina.
Treasurer—Wilbur Duncan, Botany Dept., Duke University, Durham, North Carolina.

The members of Tau chapter report a most interesting and profitable summer. Nearly all the active members and professors were engaged in research of one kind or another. The recent recipients of the Ph.D. degree were busily engaged in job hunting, with almost unanimous success.

Dr. A. S. Pearse, head of the Zoology Department spent the summer in Yucatan, studying the animal forms found in the cenotes. He brought back many tales, and many souvenirs, among which were several pairs of Mexican sandals and belts, made from the very best leather, if strength of odor is any criterion. Dr. F. G. Hall accompanied Dr. Pearse, but confined his studies to blood studies of the various reptiles found in that country, and studies of the Maya Indians. He presented his impressions, illustrated with colored moving pictures in a lecture to Phi Sigma which he entitled "In the Land of the Kukulchan".

Dr. Dwight L. Hopkins has returned to Duke after a year's leave of absence. He spent most of his time at Tortugas and Woods Hole, where he studied the physico-chemical properties of the marine amoebae. Other members of the department were engaged in research or teaching at Duke during the entire summer.

Dr. H. L. Blomquist is taking a quiet sabbatical leave this year, devoting his time to yet further studies of the ferns which are his specialty. Dr. Paul J. Kramer is the acting head of the department during Dr. Blomquist's leave. Dr. Kramer is engaged in active research concerned with the water relations of plants. Dr. H. J. Oosting left Lake Junaluske Summer School in time to arrive in Minnesota during the worst of the forest fires in that part of the country.

Dr. Lewis E. Anderson, a former president of Tau chapter has returned as an instructor in Botany. His specialty is Cytology, in which he received a Ph.D. from the University of Pennsylvania in 1936. Mr. Don. Correll is assisting in the Botany department, after a summer spent in hunting orchids in Florida and the South Atlantic Coast. He has completed a survey of the orchids in North Carolina, and is now planning a more extensive study which will include all the Southeastern States.

The Forestry Department is making an intensive study of the water relations and the soil composition of the forest, in line with the comprehensive study of Forest Ecology generally. Dr. F. S. Harrar from the University of Washington has joined the Forestry Department Staff. Dr. Harrar is a specialist on wood technology.

Graduate research in the forestry department includes respiration studies, measurements of bound water, and estimations of enzyme systems in germinating seed. Mr. Yen-Chieh Wang, from China, has many interesting things to tell of the reforestation plans of the Chinese government, and reveals that there is very much to be done along that line, especially along the great rivers.

Five out of six of last year's Ph.D.'s have landed jobs. All were active members of Tau chapter.

Helen Spangler is teaching Botany at East Carolina Teacher's College in Greenville, N. C.

W. D. Billings is instructing in Botany at the University of Tennessee at Knoxville.

J. F. Reed is head of the Biology Department at Amarillo Junior College, Amarillo, Texas.

H. F. McCutcheon teaches physiology at State College, Raleigh, N. C.

J. S. Rankin is assisting in the Zoology Department at Amherst.

Tau chapter is looking forward to a year of many efforts, and, we hope, good results. There will be several new members before long, and they too, can enjoy the programs which have already started off well.

Sarah Culbreth, *Secretary.*

Upsilon

President—Frank Hale, Ogden Hall, Oxford, Ohio.
Vice-President—Richard Biery, Ogden Hall, Oxford, Ohio.
Secretary—June Hake, 115 E. Withrow, Oxford, Ohio.
Treasurer—John Diver, 116 W. Collins, Oxford, Ohio.

Phi

President—Clyde W. Monroe, 22 Ballad St., Durham, New Hampshire.
Vice-President—Janice Pearsons.
Secretary—Mary Tingley, Horticultural Dept., University of New Hampshire, Durham, New Hampshire.
Treasurer—Genevieve Walker, Scott Hall, University of New Hampshire, Durham, New Hampshire.

Psi

President—Frederick F. Johnson, College of Pharmacy, University of Washington, Seattle, Washington.
Vice-President Robert H. Du Vall, Botany Dept., University of Washington, Seattle, Washington.
Secretary—Charles L. Harding, Zoology Dept., University of Washington, Seattle, Washington.
Treasurer—Estelle Koozin, College of Pharmacy, University of Washington, Seattle, Washington.

Psi Chapter ended the 1935-36 school year by initiating the following:

Bassett, Louis H.
Beck, Roger S.
Du Vall, Robert H.
Klein, David S.
Ostroff, Violet
Proctor, Phimister, Jr.

At this meeting an interesting pair of lectures on tuberculosis were presented. J. Durward Thayer of the McDermott Foundation talked on "Recent Advances in T. B. Research" and this was supplemented by a review of "The X-ray Diagnosis of Tuberculosis" by Doctor Fred B. Exener, local radiologist.

During the 1936-37 school year we will present a symposium of four related talks on evolution:

Historical Basis of Evolution
Evolution of the Animal Kingdom
Evolution of the Plant Kingdom
Sociological Aspects of Evolution

The first subject was ably presented by Dr. Melville Hatch of the zoology department at our first fall meeting, October 21. At this meeting, Robert H. Du Vall was elected Vice-President to fill the vacancy created by the resignation of Robert Williams. Mr. Williams accepted a fellowship in the Botany Department of Cornell University.

Dr. James M. Dille of Xi chapter, recently of the Department of Pharmacology and Materia Medica of Georgetown University School of Medicine has become professor of pharmacology in our College of Pharmacy and is enjoying his renewed affiliation with Phi Sigma.

Psi chapter regrets to announce the death of Mr. Lowell Lloyd, teaching fellow in the Zoology department. To Mrs. Lloyd (president 1935-36) we offer our sincere condolence for her bereavement.

Psi chapter regrets to report the death in Seattle on October 7, 1936, by his own hand, of Lowell Clyde Lloyd. Dr. Lloyd was elected to membership in Psi chapter in 1929; he was vice-president of the chapter, 1930-1931, and was elected president for the following year, an office which his absence from the campus prevented him from filling. He has always been interested in chapter affairs.

Lloyd was born Dec. 5, 1903, in Omaha and attended the University of Nebraska. He transferred to the University of Washington in 1928, receiving a B.S. *cum laude* in 1929, an M.S. in 1931, and a Ph.D. in August, 1936. Since 1930 he has been a teaching fellow in the Department of Zoology. In addition to Phi Sigma, he was a member of Sigma Xi, Phi Beta Kappa, Phi Kappa Psi, the American Microscopical Society, and the A.A.A.S. He specialized in helminthology under Professor John E. Guberlet, and collaborated with Professor Guberlet in the preparation of several papers for publication. He gave every promise of having crossed the threshold of a notable scientific career.

Quiet and reserved, Lloyd was characterized by the brilliance of his mind, the soundness of his scholarship, and the excellence of his judgment. On August 27, 1936, he married Dr. Harriet Exline, likewise a former vice-president and president of Psi chapter.

Three or four days before his death Lloyd's eye-sight began to fail as the result of an acute infection. Faced with the possibility of permanent blindness, he chose not to become what he thought would be a burden.

The titles of Dr. Lloyd's papers are:

A new genus and species of Monorchidae. Jour. Parasitol. 18, 1932, pp. 232-339, 4 fig. (with John E. Guberlet).

Two species of Mecoptera from Alaska. Pan-Pac. Ent. 10, 1934, pp. 119-120, 3 fig.

Syncoelium filiferum (Sars) from Pacific salmon. Trans. Amer. Micr. Soc. 55, 1936, pp. 44-48, 4 fig. (with John E. Guberlet).

Some digenetic trematodes from Puget Sound Fish. (Doctor's thesis to be published).

The following persons were initiated into Psi chapter, May 21, 1936:

Bassett, Louis Herbert
Beck, Roger Stanley
DuVall, Robert Henri
Hower, John Henry
Klein, David Sidney
Lobell, Milton John
Proctor, Phimister, Jr.

FREDERICK F. JOHNSON, *President.*

Omega

President—Mildred Pool, Dept. of Zoology, University of Oklahoma, Norman, Oklahoma.
Vice-President—Pauline Hoisington, Dept. of Botany, University of Oklahoma, Norman, Oklahoma.
Secretary—Mildred Hawkins, Dept. of Botany, University of Oklahoma, Norman, Oklahoma.
Treasurer—Arthur N. Bragg, Dept. of Zoology, University of Oklahoma, Norman, Oklahoma.

The members of Omega were scattered over the United States this summer. Mr. Charles Smith and Mr. Glenn Couch were at the University of Wyoming summer camp where they enrolled in a course in fresh water algae. Mr. Smith, now an instructor here in the University of Oklahoma, also made a study of the plains of Western Oklahoma, Kansas, and Nebraska. Dr. Paul B. Sears spoke before the summer meeting of the Botanical Division of the A. A. A. S. Dr. A. Richards, Dr. Teague Self, Dr. B. D. Barclay, Dr. Harriet Barclay, taught at the Rocky Mountain Biological Laboratory at Gothic, Colorado. Mrs. Minnie Trowbridge, Miss Helen Jo Talley, and Mr. Wilton Fisher took work there. Miss Mildred Hawkins studied in the South St. Vrain Canyon. Dr. Ortenburger taught at the Biological Station of Indiana University at Winona Lake, Indiana.

Many interesting papers are being published by our members. Mr. J.

Richard Carpenter who is studying under Professor C. Elton at Oxford, England, has published:

Concepts and Criteria for the Recognition of Communities. *J. of Ecology,* Vol. 24, No. 1, Feb., 1936.

Dr. Harold M. Hefley:

Ecological Studies on the South Canadian River Flood Plain in Cleveland County Oklahoma. *Ecological Monograph* (in press).

Mr. Arthur N. Bragg has:

Selection of Food in Paramecium trichium. *Physiological Zoology,* Vol. 9, (Oct. 1936).

Some Morphological Variations in Paramecium bursaria (Ehr.), *Arch. f. Protistk.* (in press).

Observations of the Initial Movements of the Food Vacuoles of Paramecium multimicronucleata. Powers and Mitchell, with Comments of Conditions in Other Species of the Genus. *Arch. f. Protistk.* (in press).

Notes on the Breeding Habits, Eggs, and Embryos of Bufo cognatus with a Description of the Tadpole. *Copeia,* No. 1, (May 10, pp. 14-20).

The Ecological Distribution of Some North American Anura. *Amer. Nat.* Vol. 20, pp. 459-466.

Observations of Bufo cognatus with special reference to breeding Habits and Eggs. *Amer. Midl. Nat.* (in press).

Several higher degrees were conferred this summer. Teague Self received his Ph.D. in Zoology; Mr. J. Bragg, last year's president received an M.S. in Zoology; Miss Margaret Kaeiser received an M.S. in Botany. Miss Dixie Young received a Ph.D. from Yale this summer. Miss Romana Todd, a Ph.D. from the State University of Iowa. She is now with the Minnesota State Department of Public Health as a mycologist.

At our first business meeting, we outlined the work for the coming year. Dr. Teague Self spoke on his work at Gothic for our first open meeting. Plans for a Zoological Society are being proposed for those interested in zoology.

The initiation program will be held November 17, 1936. Dr. Ackert, Dean of the Graduate School at Kansas State will be the speaker. The chapter decided since we now have a new building to ourselves, that we would hold a buffet supper in the building instead of the usual banquet.

The new Biological Science Building was ready for occupancy at the beginning of the school year. Both the department of Botany and the department of Zoology are housed in the building, for the present. The Botany wing will be built in the future.

Dr. Paul B. Sears is on a leave of absence. He is working with the Rockefeller Institute as a research associate for the improvement of the teaching of science. He has given several talks since he has been in the East.

Wilda Fritts left the University the first of October to accept a position in the Bray consolidated schools near Marlow, Oklahoma. Mr. and Mrs. O'Reilly Sandoz (Mildred Dunlap) have a baby girl. The Frank Hedges have a son, Robert Orrin.

Dr. Milton Hopkins from Harvard University replaces Dr. G. Goodman as assistant professor.

The following person was initiated into Omega chapter, May 28, 1936:

Demaree, Delzie

Sincerely yours,

MILDRED HAWKINS, *Secretary.*

Alpha Alpha

President—Dr. Harry L. Bauer, Santa Monica Jr. College, Santa Monica, California.
Vice-President—Jack Remple, Univ. of Southern California, Los Angeles, California.
Corresponding Secretary—Dorothy Pool, 341 West Raymond Ave., Hawthorne, California.
Recording Secretary—Caroline Barnes, Univ. of Southern California, Los Angeles, California.
Treasurer—Robert Rutherford, Univ. of Southern California, Los Angeles, California.

Alpha Alpha Chapter at the University of Southern California, Los Angeles, began the school year as usual with our traditional "get acquainted" meeting at the new home of Dr. Harrison.

Many of the members told of interesting trips taken this summer. These trips included not only most of the United States but also South America, Mexico, and Canada.

The activities of our members were varied this past summer, from "manicuring the lawn to passing Germain examinations, observing salmon in Alaska to stalking woodchucks in the middle West, fishing in Northern California to taking a trip through a coal mine, collecting pictures of a fire in the chaparral of Southern California, to gathering material for a 'Wildcat Story' in Oklahoma.'' (Why—Dr. Harrison!)

Dr. Johnstone of the Botany Department of the University of Southern California closed the meeting with a most interesting report of his trip to Alaska.

Francis Elmore, recent treasurer of this chapter, is now in New Mexico in charge of reconstruction and repair of the San Diego De Jemez Mission.

We are full of enthusiasm brought to us by our delegate, Mrs. Tema Clare, from the National Convention.

Alpha Alpha hopes to accomplish much this year in helping to expand Phi Sigma in Southern California.

Alpha Beta

President—Alan Donaldson, ATΩ House, Mount Union College, Alliance, Ohio.
Vice-President—Gordon Stewart, ΣAE House, Mount Union College, Alliance, Ohio.
Corresponding Secretary—Betty Ayers, 2365 S. Arch Ave., Alliance, Ohio.
Recording Secretary—Virginia Quinn, AΣΔ House, Mount Union College, Alliance, Ohio.
Treasurer—Myron Pardee, 2208 S. Rockhill, Alliance, Ohio.

Since the last publication of The Biologist, we have had several very interesting meetings featuring prominent physicians and biologists. Among them was Dr. N. Paul Hudson, the head of the Department of Bacteriology at Ohio State University who spoke to our chapter on "Yellow Fever" on May 14th. Dr. Hudson was a member of the expedition sent to Africa a few years ago by The Rockefeller Institute for Medical Research in order to study that particular disease.

No outside speakers have yet appeared on our program this year. Plans are being made to resume the custom of reading papers written by our members at occasional meetings.

Dr. Joseph M. Scott, the head of the Biology Department here at Mount Union College, led a discussion with Dr. Will Durant on biological matters at the National Teachers' Association Meeting at Cleveland on October 24th. He is going to review this meeting at an early meeting of our fraternity.

Many of our members have entered graduate school this fall. Helen Marie Stewart, who had been a graduate assistant in the Biology Department here for the last three years, has entered The Johns Hopkins University to take work leading to an Sc.D. degree. Marjorie Pattison is in the School of Nursing at The Johns Hopkins University. Selma Liebschner is doing laboratory technician work at Mount Sinai Hospital in Cleveland. Those who are attending Medical Schools are William White, Harvard; Howard Hughmanic and Donald Ruch, University of Rochester; John Hawkins and Frederick Banfield, Western Reserve; Arthur Cole, The Johns Hopkins University; Robert Dunlap, Yale; Eldon Rowland, Vanderbilt; and William Gilmore, Creighton.

On the 19th of March, Alpha Beta initiated the following people:

Harlow Frederick Banfield
Randall Carlson
Beatrice Eileen Dye
Ernest James Joslin
Robert Thomas Maurer
Myron Lawson Pardee
Mamie Geneva Roberts
Margaret Elizabeth Senn
Eunice Virginia Shannon
Virginia Marion Simms
John Puntenney Smith
Alvin Weiss
Mildred Helen Whitney
Edgar Edwin Wilms

BETTY AYERS, *Secretary.*

Alpha Epsilon

President—Warren R. Witz, Biology Dept., University of Pittsburgh, Pittsburgh, Pennsylvania.
Vice-President—Edward H. Graham, Carnegie Museum Herbarium, Pittsburgh, Pennsylvania.
Secretary—Harry J. Lipman, Biology Dept., University of Pittsburgh, Pittsburgh, Pennsylvania.
Treasurer—William F. Starkey, Biology Dept., University of Pittsburgh, Pittsburgh, Pennsylvania.

Alpha Zeta

President—J. O. Manly, Williamsburg, Virginia.
Vice-President—Carol Gouldman, Pi Beta Phi House, Williamsburg, Va.
Secretary—Louise Hill, Williamsburg, Virginia.
Treasurer—Margaret Hohnson, Phi Mu House, Williamsburg, Virginia.

The following persons were initiated into Alpha Zeta Chapter, May 11, 1936:

Bruno, Alphonse Henry Leo
Green, Albert
Hall, Louise Carpenter
Jemmott, Herbert K. Burton
Johnson, Mary Margaret
Jones, Edmund Ruffin, Jr.
Qualls, Myers Samuel
Robinson, Janet Estelle

Alpha Eta

President—Mr. Marion Spore, 713 College, Stillwater, Oklahoma.
Vice-President—Alvin Kenworthy, Horticulture Dept., Oklahoma A. & M. College, Stillwater, Oklahoma.
Secretary-Treasurer—Willie Frederick, 713 College, Stillwater, Oklahoma.

The Alpha Eta Chapter at Oklahoma A. & M. was sent off to a good start with an opening semester meeting. Plans were laid by Marion Spore, our president, to have well planned and organized meetings each month. We hope to get several prominent local persons to make addresses to us during the school year. These will be physicians, professors, local business men and other visitors in order to widen our acquaintances and knowledge in our field of biological science. Also, we have plans to obtain several films for future showing.

This year the college is organizing a better rounded pre-medical course which will bring in a bigger field for selection of prospective members.

Professor H. I. Featherly, one of our active faculty members, is at Wisconsin for a year's study. We deeply regret his loss for the year, but feel we can better appreciate his support after his absence.

The following persons were initiated into Alpha Eta Chapter, May 1, 1936:

Diveley, Walter Lowell
Galeotti, Charles
Heller, Helen Louise
Imel, Lucille
Lytle, Wallace Walker
Mader, Ernest
McCollum, Wiley Thomas
McQuown, Albert Luis
Orr, Harry William
Wallace, Deane Dever
Willham, Oliver Siralvo

W. J. Frederick, *Secretary*.

Alpha Theta

President—Robert Clans, 676 College Station, Pullman, Washington.
Vice-President—Paul R. Kramer, College Station, Pullman, Washington.
Secretary—Glenn Edwards, College Station, Pullman, Washington.
Treasurer—Ray Moree, College Station, Pullman, Washington.

Alpha Iota

President—William B. Clemens, Tau Upsilon Omega House, Lewisburg, Pa.
Vice-President—Jerome H. Kantor, 5 N. 3rd St., Lewisburg, Pa.
Secretary-Treasurer—Margaret Keys, Women's College, Bucknell University, Lewisburg, Pa.

The following persons were initiated into Alpha Iota Chapter, May 23, 1936:

Parkinson, Jessie Elizabeth
Ritter, James Harry

Alpha Kappa

President—Ethel Poris, Hunter College High School, 96th St. & York Ave., New York, New York.
Vice-President—Mrs. Fanny S. Black, Wadleigh High School, 114th St. & 7th Ave., New York, New York.
Secretary—Miss Alwin Winstein, Columbia University, 116th St. & Broadway, New York, New York.
Treasurer—Mildred Schweiger, 64 Jesup Place, New York, New York.

The first fall meeting of the Hunter College Chapter was a field trip to Cold Springs Harbor led by Dr. Simpson. The group saw Dr. Blakeslee's model of the chromosome formation in Datura and Dr. Blakeslee's demonstration of heterothallism in Phycomyces. Many other demonstrations of genetic importance were viewed including one on Dr. Sinnott's work on gourds. The group was given the P. T. C. tasting test. A new way of plotting probability curves in offspring of racehorses. Last of all was a demonstration of the latest methods used in studying the giant chromosomes of the larvae of Drosophila.

Several members of Alpha Kappa are engaged in important graduate work. Among these are Ethel Poris, our President, who has a fellowship at New York University and Dinah Marmer who has a fellowship in Botany at Columbia University. Margery Green, our former President is now teaching at the University of Maine.

The following people were initiated into Alpha Kappa Chapter, May 29, 1936:

Bloom, Florence
Borek, Irene R.
Drachler, Esther M.
Dunning, Marcelle Frances
Ehrlich, Pearl
Epstein, Selma
Maisler, Mildred
Scavone, Carmela
Silberman, Gertrude
Spector, Mildred
Wasch, Charlotte

Fanny S. Black

Alpha Lambda

President—Mr. Francis Flaim, Dept. of Botany, University of Utah, Salt Lake City, Utah.
Vice-President—Miss Helena Rice, Dept. of Bacteriology, University of Utah, Salt Lake City, Utah.
Secretary—Lily Meldrum, Dept. of Bacteriology, University of Utah, Salt Lake City, Utah.
Treasurer—Mr. Dilwirth Marchant, Dept. of Botany, University of Utah, Salt Lake City, Utah.

Alpha Lambda Chapter has begun another year of activity and is expecting this year to be one of the most successful we have had. We have, so far this year, held three successful, well attended meetings. And we were the guests of Mr. Sylvester Walsh in his Summer home in Emmigration Canyon for a very pleasant party.

Last Spring in our concluding meeting we listened with great interest to reports on the Theses of members who were to receive Masters Degrees. We are going to encourage our research students to give similar reports as a routine plan each year.

Altho not all of our members are doing research work, it is a very important issue in our Chapter. A high percentage of our student members are working for their Masters Degree on very interesting problems and one of our faculty members, Dr. Don Rees, recently received his Ph.D. at Stanford University. The title of his Theses is ''The Biology of the Mosquitos of Utah.''

We all look forward to receiving the ''Biologist''. Of particular interest in the last issue, were the reports on the National Convention held in St. Louis. Phi Sigma can well be proud of the fine research being done by its members. We also especially enjoyed the article on the ''Decadence of the Male in the Animal Kingdom'' by Dr. David Causey.

Alpha Lambda wishes good luck and success to all the Chapters and to the ''Bigger Better Biologist''.

Sincerely,
Estella Calderwood Marchant, *Secretary.*

Alpha Mu

President—Georgena Samson, Graduate Division, Oregon State College, Corvallis, Oregon.
Vice-President—Noel Gross, 210 N. 16th St., Corvallis, Oregon.
Secretary—Bernice J. Gross, 210 N. 16th St., Corvallis, Oregon.
Treasurer—George Ferguson, 622 N. 29th St., Corvallis, Oregon.

The following persons were initiated into Alpha Mu Chapter, May 21, 1936:

Bailey, Warren H.
Carlton, Ruth Mary
Chiu, Shin Foon
Fuhrman, Frederick A.
Gross, Bernice Johnson
Smith, Rodney Errol
Starr, Virgil Evans
Steel, George F.
Thayer, Mary Ellen
Webb, Robert Billings
Wheeler, Shirley Elaine

Alpha Nu

President—Marion Rohonec, Alpha Delta Pi House, University of New Mexico, Albuquerque, New Mexico.

Vice-President—Elizabeth Hardway, Girls' Dormitory, University of New Mexico, Albuquerque, New Mexico.

Secretary—Margaret Boles, Kappa Kappa Gamma House, University of New Mexico, Albuquerque, New Mexico.

Treasurer—Rilla Brink, Girls' Dormitory, University of New Mexico, Albuquerque, New Mexico.

Alpha Xi

Secretary—Miss Eleanor H. Birch, Rhode Island State College, Kingston, Rhode Island.

THEY'RE DEVELOPING NEW AMERICAN INDUSTRY

ROQUEFORT—University of Minnesota scientist W. B. Combs has accomplished the impossible by producing Roquefort cheese that is almost like the real French Roquefort in caves along the Mississippi near the Twin Cities from cows' milk.

—*The Collegiate Digest*

THERE IS A LIMIT!

''What shall I do?'' wailed the sweet young thing. ''I'm engaged to a man who just can't bear children.''

''Well,'' remarked the kindly old lady, ''you mustn't expect too much of a man.''

—*U. S. S. Louisville Derby*

BOOK REVIEWS

Reviews printed here represent the candid opinions of various readers, not necessarily those of the members of the National Council, nor even those of the Editor.

HEADLINERS

Esteemed by the reviewer as outstanding.

COMPARATIVE ANATOMY, H. V. NEAL and H. W. RAND, *P. Blakiston's Son & Co., Philadelphia, 1936. $4.75.*

When the professors of zoology at Tufts and Harvard unite to produce a new text on comparative anatomy the biological world looks on with more than passive interest. Whether this new volume will prove to be *the* outstanding publication in the zoological year remains to be seen. That it will be one of the few outstanding texts seem to go without saying. The profoundly philosophical background on which it has been sketched, and the thoroughly workmanlike manner in which the multitudinous details have been handled would seem to justify our conclusion. It is the latest reference work which must appear on the shelves of our comparative anatomy laboratories.

GEOGRAPHY, An Introduction to Human Ecology, C. L. WHITE and G. T. RENNER, *D. Appleton-Century Co., New York, 1936. $4.00.*

Sociology and economics must both be built on an ecological foundation, and in its widest sense, ecology is geography. Hence is the appeal and the importance of this valuable new approach to all these various fields, an approach which is enlivened with a world of detail always interesting, and always surprisingly "pat." Another outstanding book of the year.

GROWTH HORMONES IN PLANTS, P. BOYSEN-JENSEN translated by G. S. AVERY and P. R. BURKHOLDER, *McGraw-Hill Book Co., New York, 1936. $3.50.*

A competent translation places before English-speaking botanists the summaries and collected opinions of various authors on the growth hormones as they were originally presented by the author in 1934. The work is critical, distinguishing between facts and the hypothetical views of some investigators. As such it should stimulate the interest of those whose research brings them into the little-worked field of the growth hormone.

IMMUNOLOGY, N. P. SHERWOOD, *The C. V. Mosby Co., St. Louis, 1935. $6.00.*

This looks like a very effective textbook for the pathogenic bacteriologist and the medical student. It will not be without its appeal to bio-chemist and the health technician. The fact that the stress is laid on the student doing his own work and thinking is an added recommendation for it.

THE LIVING GARDEN, E. J. SALISBURY, *The Macmillan Co., New York, 1936. $3.00.*

"God Almighty planted the first garden," wrote Sir Francis Bacon, and ever since the primitive gardening of our prehistoric ancestors there has been an irresistible attraction even for men of science in a garden. Unfortunately, as the author observes, too many botanists do not go in for gardening, and too many gardeners do not know much about the results of botanical research. For this reason Dr. Salisbury's book is a most valuable publication, which should have wide and interested appeal.

MANUAL OF BIOLOGY, G. A. BAITSELL, *The Macmillan Co., New York. 1936. $2.50.*

Yale scores again! While it may not be the winning touchdown in the biological teaching game, this book very definitely scores and Dr. Baitsell deserves the credit. After one has reviewed text after text each designed and highly resolving to lift the teaching of beginning courses out of the sloughs of what Dr. Wheeler calls "the dry rot of academic biology," the reviewer is more than prone to pick up each successive new text with a bored, blase and utterly unconvinced: "Ho, hum! Just another freshman text!" And *that* was our introduction to this Baitsell book. To say that we were pleasantly jolted out of our boredom is putting it mildly. Summing up all the obviously novel and evidently effective devices for injecting new spirit into elementary course-work would lengthen this review beyond all reason. The book, we honestly state, must be seen to be appreciated.

MORPHOLOGY OF VASCULAR PLANTS, A. J. EAMES, *McGraw-Hill Book Co., New York, 1936. $4.00.*

Given the exacting scholarship of Dr. Arthur J. Eames of Cornell and the equally accurate printing technique of the McGraw-Hill people and you have the ingredients for another outstanding textbook or reference work in the lower groups of the vascular plants. Beginning with the club mosses and treating each group in order up to the Polypodiaceous ferns, the author ends his contribution with three chapters on the fossil remains of the lower forms. A single chapter on the plant body of these forms, on alteration of generations, and the classification of the tracheophyta fittingly concludes the book.

OUR FRIENDS THE TREES, P. G. CROSS, *E. P. Dutton & Co., Inc., New York, 1936. $5.00.*

An authoritative, yet popularly written, work on trees and how to appreciate, grow and use them. This book is definitely in line with Paul Sear's "Deserts on the March" in its appreciation of our wasteful forest neglect program. It deserves wide circulation, not only in each educational institution library but also in every single public library in the land. Only by making our American people tree-conscious, to use a much abused term, can there be any hope of an intelligent program of conservation of our forest resources. Ask your librarian for this work, and insist on its being put on the library shelves.

OUR INSECT FRIENDS AND FOES AND SPIDERS, Edited by G. GROSVENOR, *The National Geographic Society, Washington, 1935. $2.50.*

This attractive series of reprints of recent articles on the insects which have appeared in the always interesting "National Geographic Magazine" deserves a place in every public and high school library. It will also serve to make brighter, and considerably more intelligent, the average college freshman's approach to the study of the insects in his zoology course. Not the least important are the multitude of the "Geographic's" usual effective color plates.

TREE FLOWERS OF FOREST, PARK AND STREET, WALTER E. ROGERS, *Published by the Author, Appleton, Wisconsin, 1935. $7.50.*

This volume is one of the book events of the past year. The printing and engraving reach a high standard of excellence, but excellent as they are they cannot approach the inimitable beauty of Walter Rogers' photographs of the exotic beauty of the flowers of so many of our common, and altogether unnoticed street and garden trees. Not only are the illustrations, both photographic or line etchings, epoch-making, the text is equally as interesting. This book should unquestionably be in every library, be it public or private, secondary or collegiate.

A B C OF THE ENDOCRINES, JENNIE GREGORY, *Williams & Wilkins Co., Baltimore, 1935. $3.00.*

Here is a popular outline of our present knowledge of the endocrines. It consists of an absolute minimum of printed matter, and a great wealth of diagrammatic illustrations, outline drawings and cartoons to develop its theme. While the subject matter is, perhaps, a little too advanced for a grade school student, there is no question but that a wide awake youngster could understand it. It ought to be a boon for college students, and should be in every college library.

AIMS AND METHODS OF MEDICAL SCIENCE, JOHN A. RYLE, *Cambridge, at the University Press, Macmillan Co., New York, 1936. $0.75.*

The inaugural discourse of the Regius Professor of Physics in the University Cambridge, in which the Doctor and the student are both taken to task for too much unprepared specialization in narrow fields, and a plea is made for a "better provision in our universities for the training of scientific physicians as well as medical scientists."

ANIMAL MICROLOGY, FOURTH EDITION, MICHAEL F. GUYER, *University of Chicago Press, Chicago, 1936. $2.50.*

This classical text by the Professor of Zoology at the University of Wisconsin has become a standard reference in so many laboratories, and is to be found in so many libraries, that it needs no introduction. In presenting from time to time in the four editions of his work, the newest and best proven methods of cytological as well as histological technique, Dr. Guyer has made every student of the technical zoological laboratory his debtor.

AQUARIA AND GARDEN PONDS, W. HAROLD COTTON, *A. & C. Black, Ltd., London, The Macmillan Co., New York, 1935. $1.35.*

Another of those charmingly informal and exceedingly informative English handbooks which make scientific hobbies both easy and intelligent. There is a wealth of practical suggestions in this book, and, as usual in English publications, no index.

BIOLOGY FOR HIGH SCHOOLS, BROTHER H. CHARLES, *St. Marys College, Winona, Minn. 1936.*

A new text for Catholic High School Biology classes by a veteran teacher whose work is not unfavorably known at the University of Chicago. The book is practical, and the fifteenth chapter, on "Man's Needs" with its paragraphs on the need for scientists is a courageous jewel. Very few if any of our modern textbooks for high schools so openly and frankly challenge the students' interest in science as a lifework.

BIRDS IN THE WILDERNESS, GEORGE MIKISCH SUTTON, *The Macmillan Co., New York, 1936. $3.50.*

The adventures of an ornithologist who is curator of birds at Cornell University should be authoritative source of information for those who season their ecology with a little romance, adventure and enthusiasm. This book deserves a high place in the interesting publications of the year.

BOOK OF CACTI, H. C. LAWSON, *Lawson Cactus Garden, 1223 So. Alamo St., San Antonio, 1935. $1.00.*

Authentic information on a little known and always more or less mysterious group of plants. This well,—better say,—profusely illustrated manual was designed for the amateur cactus fancier. It should fulfill its purpose admirably.

BOTANY, J. BEN HILL, LEE O. OVERHOLTS and HENRY W. POPP, *McGraw-Hill Book Co., New York, 1936. $4.00.*

This very complete text will be of value in those courses in which an encyclopedia of general botanical information must be made available to the beginning student. This is the announced purpose of the authors, and it would seem that they have succeeded. The text follows the standard treatment in discussing first the structures and functions of plant parts, and then giving in the second half of the book a detailed series of studies on the various forms from the simplest thallophytes to the angiosperms. Evidently the authors do not agree with most recent cytological publications, especially the latest edition of Sharp's "Cytology" printed by the same firm. They still use the spireme as a definite structure in the stages of cell division. In the Sharp text the word is not even found in the index. Speaking of indices calls attention to the fact that the index alone in the present work occupies twenty-five double columned pages of fairly small print, which should be adequate.

CHRONICA BOTANICA, Vol. II, *Chronica Botanica, Ltd., P. O. Box, 8, Leiden, Holland. 1936.*

This yearbook of the plant sciences, the first and only one of its kind issued, has so many commendable features that it is hard to single many of them out for special mention. Naturally the two main features of the work are, first of all, the review of all branches of the plant sciences for 1935, extending as it does from Alaska to Zanzibar, and the reports of the International Botanical Congress in Amsterdam, as well as other important botanical gatherings. This reviewer finds the following more or less unique features just as important and interesting,—the plentiful use of excellent group and individual photographs, the lively vitality of a scientific work which does not scorn to use amusing cartoons, the departments devoted to discussions and announcements, to queries, and to new and changed addresses, the editorial notes, the international nature of the advertisements, and above all, and beyond all, the extensive, complete and accurate index. This book should be in every botanist's, and in every college library.

COLLEGE BIOLOGY, W. H. WELLHOUSE and G. O. HENDRICKSON, *F. S. Crofts & Co., New York, 1936. $3.00.*

A new text in college biology which has much to commend it, not the least of which is its comparative brevity. While not all the illustrations are new they are, on the whole, apt to their purpose, clear, distinct and adequately labeled. The book follows the traditional structure in that plants and animals are indiscriminately used from the simplest to the most complex. The reference works listed at the end of each chapter are evidently supposed to be in the laboratory library. Neither date, or publisher is listed in connection with them.

COLLEGE ZOOLOGY, ROBERT W. HEGNER, *Macmillan Co., 1936. $3.50.*

This is the fourth edition of a classic text in American zoology. It marks a decided advance over each previous edition, most of the changes from the last edition being both reasonable and probably helpful. One who has used the book both as a class and lecture reference notes that the author evidently believes the old Latin proverb "bis repitita placet." Practically each form is first rapidly and roughly discussed, then more carefully and in detail. To the student this may be helpful, but the seasoned teacher doubts its advisability. The term *rhabdites* is used in reference to the Turbellarians, but it is nowhere explained in the text, nor is it included in the glossary.

COLOR CHANGES OF ANIMALS IN RELATION TO NERVOUS ACTIVITY, G. H. PARKER, *University of Pennsylvania Press, Philadelphia, 1936. $1.50.*

The eminence of the author, and the occasion which prompted its publication,—the Leidy Memorial Lecture at the University of Pennsylvania,—put this slim volume in the required readings class for any advanced course in zoology or physiology. Dr. Parker is one of those inspired and inspiring teachers who are leaving a distinct and permanent record on the history of American zoology.

COMPARATIVE PSYCHOLOGY, Vertebrates, C. J. WARDEN, T. N. JENKINS and L. H. WARNER, *The Ronald Press, New York, 1936. $4.50.*

Ninety-four pages of bibliography dealing with the published literature from the fishes to the primates make this topical treatise of the psychological reactions of vertebrates an invaluable reference work. It is the second of a series of three works on comparative psychology under the editorship of Dr. Albert T. Poffenberger, Professor of Psychology at Columbia University.

CYCLOPEDIA OF HARDY FRUITS, U. P. HEDRICK, *The Macmillan Co., New York, 1922. $3.00.*

Placing this valuable reference on the market at the present price was an opportune move by the publishers. There has rarely been a year in which so much interest in both artistic and utilitarian horticulture has been as widespread as at present.

THE EGGS OF MAMMALS, GREGORY PINCUS, *The Macmillan Co., 1936. $3.75.*

The assistant professor of general physiology at Harvard makes his contribution to the Experimental Biology Monographs. The very nature of the project in the issuance of this series makes this book deserving of thoughtful attention. In that it details the results of much of the new techniques in mammalian embryology, it will attain additional prominence and authority.

AN ELEMENTARY MANUAL OF PHYSIOLOGY, RUSSELL BURTON-OPITZ, *W. B. Saunders Co., Philadelphia, 1936. $2.50.*

What teacher, or student of general physiology has not heard of Burton-Opitz? He has become one of the standard authors in the text-book field. This new edition, the fifth, since 1922 merits all the following its predecessors have created.

ELEMENTS OF PSYCHOLOGY, KNIGHT DUNLAP, *The C. V. Mosby Co., St. Louis, 1936. $3.00.*

A new text in psychology based on the author's previous "Elements of Scientific Psychology." Not all psychologists agree on Dr. Dunlap's definition either of the *psyche* or psychology. To those who do not this text will be an authoritative presentation of nervous physiology, to those who agree it will be all that can be desired in the most up-to-date presentation of the whole field of psychology.

ESSAYS IN ANTHROPOLOGY, Edited by R. H. LOWIE, *University of California Press, Berkeley, 1936. $6.50.*

Thirty-six essays on anthropological subjects constituting a "festschrift" in honor of Dr. Alfred Louis Kroeber, of the University of California, on the occasion of his sixtieth birthday. Not only the position of the revered professor so honored by his friends and students, but also the intrinsic merits of the papers included in the collection, make this a valuable work.

ESSAYS IN GEOBOTANY, Edited by T. H. GOODSPEED, *University of California Press, Berkeley, 1936. $3.50.*

In honor of the seventieth birthday and the fortieth year of service to his university as well as his retirement from the active professorship of botany of Dr. William Albert Setchell, eleven representative authors throughout the world have contributed essays to this *festschrift.* The names of Arrhenius, Babcock, Chaney, Clements, Cooper, Diels, Fritsch, Hoagland, Merrill, Rübel and Skottsberg are the best guarantee for the importance of the book.

FERNS, FARIDA A. WILEY, *H. G. Fiedler, New York, 1936. $1.00.*

This handy pocket-size booklet embodies several useful features which might become much more common in other books of similar purpose. The lower portion of each blade is outlined in natural size, and the entire plant is figured to scale. The cross-section of each stipe with the vascular bundles are also shown, making it easy to identify the various forms.

FIELDBOOK OF ILLINOIS WILD FLOWERS, *Illinois State Natural History Survey, Urbana, 1936.*

A handy, slightly more than pocket sized, and undoubtedly useful manual of the wild flowers of Illinois. It should prove equally as useful to the wildflower lovers of the states surrounding Illinois, particularly Indiana, Missouri, Iowa and the southern tier of Wisconsin.

FOREST INSECTS, R. W. DOANE, E. C. VAN DYKE, W. J. CHAMBERLAIN, and H. E. BURKE, *The McGraw-Hill Book Co., New York, 1936. $4.50.*

The growing interest and the importance attaching to the preservation and further development of our forest resources, makes the arrival of this book particularly opportune. Its authors are eminently competent to tackle the knotty problem of forest and wood preservation from insect ravages, and seem to have adequately acquitted themselves of their purpose. The volume will be particularly helpful to forestry schools.

GENERAL BIOLOGY, JAMES W. MAVOR, *The Macmillan Co., New York, 1936. $4.00.*

Giving about three times as much space to the various animals as to the plant forms, Dr. Mavor's text conforms to the usual academic treatise on type forms so closely that any biologist who has been trained in the average college course should find it an easy book to teach from. For the wide awake teacher who wishes to make of biology something more than an academic foray into the woods of physiology, morphology and evolution perhaps the ideal textbook has not yet been written.

GENERAL ENTOMOLOGY, ROBERT A. WARDLE, *P. Blakiston's Son & Co., Philadelphia, 1936. $2.25.*

Comparatively inexpensive, as textbooks go, and of small compass, this manual should adequately serve the purpose for which it was intended,—to give the student who is not majoring in entomology the general, and not the highly specialized, types of information necessary. We need more textbook writers with as much good sense and discretion.

GREEN LAURELS THE LIVES AND ACHIEVEMENTS OF THE GREAT NATURALISTS, DONALD CULROSS PEATTIE, *Simon & Schuster, New York, 1936. $3.75.*

An ably written and lively narrative of some of the important naturalists from the herbalists to Fabre. There is no student of biological history but can benefit by the author's sympathetic accounts of Linnaeus and of the early American naturalists, and I like the somewhat derogatory chapter on Buffon. On the other hand, I feel that Peattie's account of the pre-Linnaeans hardly equals that of Locy in *The Growth of Biology*, and the accounts of the Romanticists and of Darwin, while adequate, are not up to those of Nordenskiold in the *History of Biology*. Finally, I much prefer Nordenskiold's interpretation of Cuvier to Peattie's. Cuvier was a very great scientist, insisting upon the facts as he discovered them, rightly ridiculing the inadequate evolutionary speculation of his day, yet at the same time establishing the very data that the next generation was going to use in establishing the truth of evolution. Science is primarily a matter of facts and observation, and inadequate theories founded on true observations are more significant than true theories that are simply "jumps in the dark," without adequate facts behind them. The book has 370 pages, an extensive bibliography, 20 portraits and 11 other illustrations.—Melville H. Hatch.

THE HABITAT AND FOOD OF THE CALIFORNIA SEA MUSSEL, Edited by D. L. Fox, *University of California Press, Berkeley, 1936.*

A monograph from the bulletin of the Scripps Institution of Oceanography contributory to our knowledge of the Pacific lamellibranch, the large edible sea mussel, Mytilus californicus.

HOW ANIMALS DEVELOP, H. C. Waddington, *W. W. Norton Co., New York, 1936. $2.00.*

The function and behavior of the organization center in embryology written in a clear and interesting style for the elementary student and the wide awake layman.

HOW WE CAME BY OUR BODIES, Charles B. Davenport, *Henry Holt and Co., New York, 1936. $3.65.*

The physiology and morphology, the cytology, histology, genetics and embryology of the human race told in a nontechnical manner for those who are interested in remedying the declining birth rate. A work of particular value to prospective parents, physicians and social workers.

HUMAN GENETICS AND ITS SOCIAL IMPORT, S. J. Holmes, *McGraw-Hill Book Co., New York, 1936. $3.50.*

This volume is hardly a textbook. It is the matured and ripened opinion of a well-known zoologist, looking at his world and applying to it the sociological implications of his study, his philosophy of life, and his experiments. As such the book has much to commend it, whether one agree with his conclusions or not. It is bound to be thought-provoking.

HUMAN PHYSIOLOGY, P. G. Stiles, *W. B. Saunders Co., Philadelphia, 1936. $2.25.*

This is the seventh revised edition of a well-known text that has long merited the confidence and interested patronage of both teachers and pupils. It richly deserves their continuance and amplification.

THE IRISES OF SOUTHEASTERN LOUISIANA, Percy Viosca, Jr.

An interesting paper reprinted from the "Bulletin of the American Iris Society," giving a taxonomic and ecological interpretation of some of the plant features in that ecologist's jig-saw puzzle, southeastern Louisiana.

TYPE INVERTEBRATE FOSSILS OF NORTH AMERICA (DEVONIAN), A. K. Miller, *Wagner Free Inst. of Sci., State Univ. of Iowa, 1936.*

A collection of illustrations, descriptions and observations on 50 Ammonoidea which we understand are to become part of a larger work later on. Valuable for paleozoologists.

J. ARTHUR HARRIS, BOTANIST AND BIOMETRICIAN, Edited by Rosendahl, Gortner and Burr, *University of Minnesota Press, Minneapolis, 1936. $2.50.*

A memorial to Dr. J. Arthur Harris in the shape of a series of three reminiscent articles on Harris, the Man, the Botanist and the Biometrician, as well as a number of papers by the late head of the department of botany at the University of Minnesota written in conjunction with his pupils.

LABORATORY DIRECTIONS IN COLLEGE BIOLOGY, Wellhouse and Hendrickson, *F. S. Crofts & Co., New York, 1936. $.85.*

This is a canny kind of a laboratory note book. It gives each student a compact, handy lab notebook and manual in one set of covers. By so doing the authors are assured that their laboratory notebook will be sold one to each student every year and not resold in the usual second-hand fashion. A more important feature is the outline drawings which have been thoughtfully provided, thus saving the student's time and energy for more accurate laboratory study and dissection.

A LABORATORY MANUAL FOR GENERAL ZOOLOGY, K. M. Roehl and H. H. Newman, *The Macmillan Co., New York, 1936. $1.00.*

This new manual is evidently planned to supplant the senior author's well-known "Laboratory Guide and Review Manual" of 1929. It appears to be thoroughly workable, intelligently planned and adequately presented. The changes between it and its predecessor are so great that no instructor should attempt to use both in the same laboratory section.

A LABORATORY MANUAL FOR GENERAL BIOLOGY, J. W. Mavor and L. B. Clark, *The Macmillan Co., New York, 1936. $1.75.*

Here is another laboratory manual and note-book combination in the newest streamlined style of the modern laboratory procedure. It should help the student to attain an adequate knowledge of zoology with a minimum of extra effort, originality or mental anguish. Our bet is that the covers will be off after a week's use in the laboratory.

LABORATORY PLANT PHYSIOLOGY; B. S. Meyer and D. B. Anderson, *Edwards Brothers, Inc., Ann Arbor, 1935. $1.75.*

Many an embryonic and probably less than foetal plant physiologist will thank his lucky stars when he finds this adequate and helpful laboratory manual-notebook thrust into his bewildered hands. The more we look at it the more we wonder why someone hadn't the sense to do it before this.

THE MICROSCOPIC ANATOMY OF VERTEBRATES, G. G. Scott and J. I. Kendall, *Lea & Febiger, Philadelphia, 1935. $3.75.*

While this textbook is designed for an articulation course covering the overlapping border of histological embryology and vertebrate anatomy, the instructor in any course in histology, anatomy or embryology will find it a most useful reference work. It deserves a place on the shelves of every zoological library.

METHODS OF TISSUE CULTURE IN VITRO, Ralph Buchsbaum, *The University of Chicago Press, Chicago, 1936. $1.00.*

This valuable and inexpensively gotten-up paper-bound manual should prove doubly helpful to all who are interested in the new techniques of tissue culture, because it also contains a section under the title "Outlines of Histological Methods" by Clayton G. Loosli. The University of Chicago Press is to be congratulated on putting so helpful a work within easy reach of the average technician's meagre purse.

A MONOGRAPHIC REVISION OF THE GENUS CEUTHOPHILUS, T. H. Hubbell, *University of Florida, Gainesville, 1936. $3.75.*

Five hundred and fifty-one pages of text and thirty-eight plates make up a respectably ponderous tome of research on the revision of our knowledge of the inconspicuous and relatively rare cave and camel crickets. Entomologists will want this volume, of which only 1,000 copies were printed.

NEUROEMBRYOLOGY, S. R. Detweiler, *The Macmillan Co., New York, 1936. $3.75.*

The professor of anatomy in Columbia University's College of Physicians and Surgeons presents his contribution to the Experimental Biology Monographs in the shape of an experimental study of the results of embryo-surgery on the nervous system. Dr. Spemann's epochal experiments have started a series of research problems the results of much of which are collated in the present volume.

OUTLINES OF GENERAL ZOOLOGY, H. H. Newman, *The Macmillan Co., New York, 1936. $3.50.*

The maturing judgment and years of experience behind this text bespeak for it as warm a welcome as was accorded to any of its predecessors. Dr. Newman's texts were always eminently teachable, and each successive edition renders them all the more so. In colleges where the text is not actually in use by each student there should at the very least be one or more copies for reference.

AN INTRODUCTION TO PLANT LIFE, C. L. Wilson and J. M. Haber, *Henry Holt & Co., New York. $3.00.*

This is one of those rare textbooks which have been staked out to cover just exactly one semester's work in botany and no more. As such it should be a boon to the teacher who is looking for an up-to-the-minute text in which the rather bothersome process of ignoring paragraphs, skipping pages, omitting whole chapters is no longer a necessity.

PLANT WELFARE, V. H. Ries, *Doubleday Doran & Co., Inc., New York, 1936. $1.00.*

A handy, cheap, little volume dealing with the latest and most approved methods for the control of plant diseases and insect enemies. It does not treat of the kitchen or truck garden plants. Forest and lawn trees do not come in for direct consideration. For the lawn and flower garden forms, however, it seems to leave little to be desired.

THE RESIDENT BIRDS OF SOUTHERN MICHIGAN, W. H. Burt, *Cranbrook Institute of Science, Bloomfield Hills, Mich., 1936. $.50.*

A handy pamphlet with clear line illustrations which should help the residents of southern Michigan, northern Indiana and Ohio to a better and more interested knowledge of their year-around bird friends.

SOIL SCIENCE, W. W. Weir, *J. B. Lippincott Co., Chicago, 1936. $3.50.*

This book gives a history of agricultural methods from primitive times in relation to the soil, following it up with a classification of soils, and the relationship between soils and growing plants. The wide scope of the book makes it at once a good reference work for ecology as well as the various branches of agriculture. References are sketchy,—the author is given in the biographical index, and on the pages mentioned all we find is something like this: "C. B. Lipman (1917) has observed, etc." All of which is rather irritating for the scientist who wishes to follow up in the original literature just what Lipman, or anyone else, for that matter, is talking about. It is a pity that the publishers let this very deplorable lack of accurate bibliography slip through their fingers.

STATISTICAL METHODS IN BIOLOGY, MEDICINE AND PSYCHOLOGY, C. B. Davenport and M. P. Ekas, *John Wiley and Sons Inc., New York, 1936. $2.75.*

This is the fourth completely revised edition of an invaluable work of the senior author which originally appeared in 1899. Those whose research calls for constant and accurate use of quantities of statistics will, as in the past, have recourse to this convenient, pocket sized volume.

A TEXTBOOK OF HISTOLOGY, J. L. Bremer, *P. Blakiston's Son & Co., Philadelphia, 1936. $6.50.*

The fifth edition of the classical "Lewis and Stohr" has been called for by the gradual but inevitable growth of the histological phases of science. The book follows the plan of previous editions fairly closely with additional attention to the hormone producing endocrines, more stress on normal rather than pathological cell activity, and an enlarged bibliography. It is a very worthy successor to an eminently worthy line of predecessors.

THROUGH SCIENCE TO GOD, Nathan A. Smyth, *The Macmillan Co., New York, 1936. $2.50.*

Nathan Smyth's father wrote "Through Science to Faith," in 1902. It was a compilation from the Lowell Lectures at Harvard which he had previously given. His son feels that modern science has gone farther than merely faith, and so develops his theme. It is interesting.

TRAIL BLAZERS OF SCIENCE, Martin Gumpert, *Funk & Wagnalls Co., New York, 1936. $2.50.*

This work has been translated out of the original German by Edwin L. Shuman with more than average success. Gumpert's work is much like that of Paul DeKruif in style. He has elected to call to the attention of modern science several nearly forgotten pioneers in the development of our knowledge. Who ever heard of Jerome Cardan, Julius Robert Mayer, or Max Joseph von Pettenkofer? Gumpert must have some inner spite against Calvin or Calvanism. Why else should he relate with such gusto the lurid details of the martyrdom of Servetus, the Spanish physician, by the great protagonist of early Protestantism?

YALE UNIVERSITY PUBLICATIONS IN ANTHROPOLOGY, *Yale University Press, New Haven, 1936. Nos. 1-7, $2.00, Nos. 8-13, $2.50.*

Thirteen papers on anthropological subjects (mostly American Indian) published for the section of anthropology in the Department of Social Sciences at Yale University. Authentic and reliable descriptions of much of native American belief, ritual and tribal economics are here attractively set forth.

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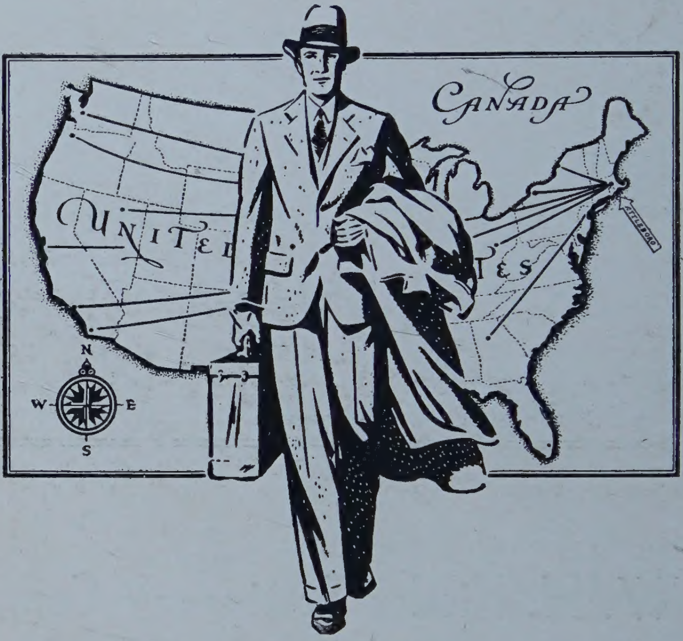

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